



TRADE AND TRANSPORTATION

A Study of North American Port and Intermodal Systems

By the National Chamber Foundation of the U.S. Chamber of Commerce

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TRADE & TRANSPORTATION



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Preface

Trade is critical to the global economy. But trade flourishes only if there is an efficient transportation system relying on a combination of modes: an "inter-modal system" that delivers cargo on time and at low cost.

The United States is the world's greatest trading nation. Its economic health depends on the current and future efficiency of its intermodal system. However, major breakdowns have developed within this system, most predominately within our ports and their highway and rail access infrastructure. As international trade is only expected to increase, the level of congestion on our already overburdened transportation infrastructure can only worsen. If the U.S. intermodal freight transportation system is allowed to fail, the impact on the nation's economic future will be severe.

The National Chamber Foundation (NCF) undertook a unique task to evaluate projected economic trends and to determine the ability of the North American transportation system to respond to changing and increasing trade patterns.

Based on economic forecasts and future import/export trends, the NCF study examined 16 of the major North American ports and their inland highway and railroad networks to determine current and projected freight capabilities. It factually describes the current conditions of the U.S. freight system

and shows the major fault lines in the transportation system. The study establishes that underinvestment in the system will cause this great trading nation to lose its competitive advantage in the global market. Finally, this study describes a strategy to systematically and proactively attack the transportation capacity challenges. These actions must be implemented quickly, or the nation's economic well-being will suffer.

To study intermodalism requires diverse experiences and expertise; consequently, a world-class Study Team was assembled and led by TranSystems Corporation, which has an international reputation for planning and designing ports, marine cargo terminals, and intermodal transportation facilities. In conducting this study, TranSystems used analytical methods and data sources that are nationally accepted standards for the port and intermodal industry. The team included the econometric consulting of Norbridge, Inc., which prepared the detailed economic forecasts for each of the 16 ports analyzed in this study. The Texas Transportation Institute and the National Ports and Waterways Institute prepared the inland transportation analysis and the policy analysis. A Blue Ribbon Advisory Panel of nearly 20 industry leaders, chaired by former Secretary of Transportation James Burnley, guided the findings of the Study Team.





Acknowledgments

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Our special thanks go to the individuals on the Blue Ribbon Advisory Panel of select intermodal stakeholders, headed by former Secretary of Transportation James Burnley, who guided the team throughout the study.

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Executive Summary

EXECUTIVE SUMMARY

The United States is the world's largest importer and exporter, accounting for 1 billion metric tons or nearly 20% of the annual world ocean-borne trade. All freight moving in, out, and within the U.S. amounts to about 15 billion tons and has a value of \$9.1 trillion. Although the vast majority of freight moves domestically, international trade amounts to \$2.0 trillion, almost half of which is containerized, manufactured

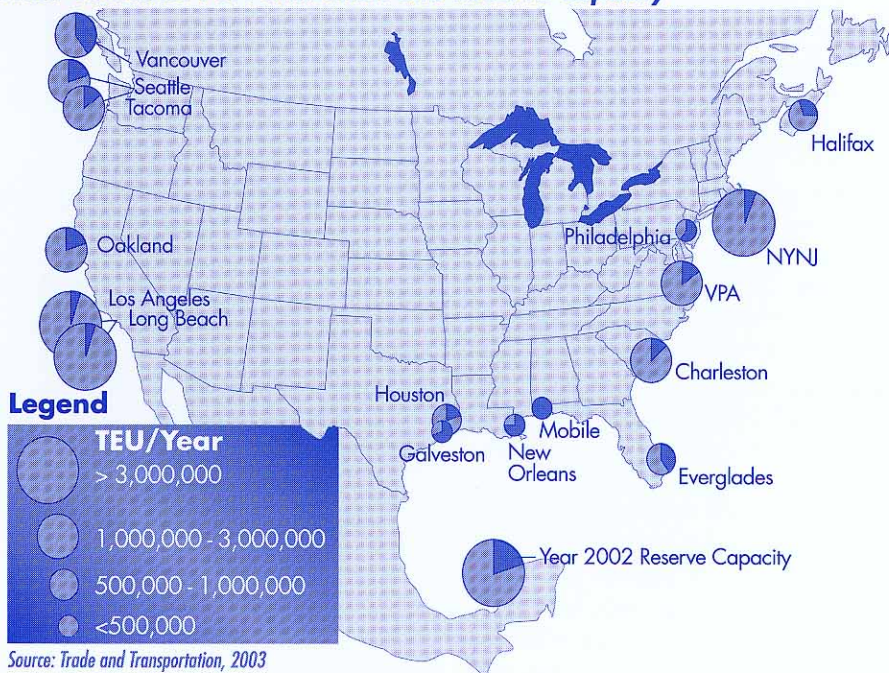
goods. This figure represents almost 27% of the entire Gross Domestic Product (GDP) that is totally dependent on international trade.

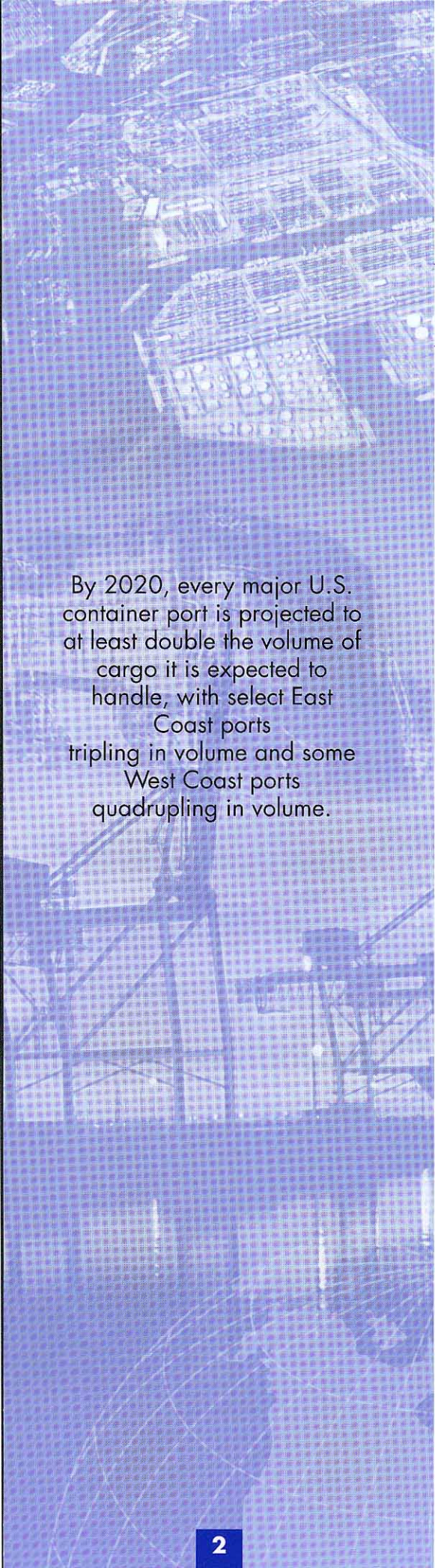
By the year 2020, even at moderate rates of economic growth, the total domestic tonnage of freight carried by all U.S. freight systems will increase by approximately 67%, while international trade will nearly double. In this same time interval, every major U.S. container port is projected to at least

"The nation's transportation system is the lifeblood of our economy. Without additional investment in our infrastructure, our system of commerce is impaired, our mobility is restricted, our safety is threatened, our environment is endangered, and our way of life is compromised."

Thomas J. Donohue
President and CEO,
U.S. Chamber of
Commerce and President,
National Chamber
Foundation

Current Container Port Utilization and Reserve Capacity





By 2020, every major U.S. container port is projected to at least double the volume of cargo it is expected to handle, with select East Coast ports tripling in volume and some West Coast ports quadrupling in volume.

double the volume of cargo it is expected to handle, with select East Coast ports tripling in volume and some West Coast ports quadrupling in volume. This immense volume of cargo must pass through the Marine Transportation System (MTS), including approximately 35 deep-water U.S. and Canadian ports that connect the U.S. economy with the rest of the world.

Only through an aggressive program of improvement will the ports keep up with this growing cargo demand. However, improvement of the North American port system presents some unique challenges. Constructing major landfills for port expansion and implementing major channel deepening projects is a decade-long, difficult, and very costly process, with the potential for significant environmental and community impacts. For example, a recently completed Port of Oakland dredging project experienced up-front costs for engineering, permitting, and environmental compliance that exceeded the actual cost of the dredging. The United States is now in a situation where its ports and intermodal terminals can no longer build their way out of capacity problems; they must do more, do it faster, and do it cheaper with fewer resources than ever before.

Not only are ports facing capacity challenges, they are also seen as the "front line" in a war against international terrorism. The irony is that ports have always had to protect themselves from intrusion, theft and sabotage, but

now they are expected to be the gatekeepers for the entire supply chain, preventing the illegal entry of terrorists and weapons of mass destruction. The ports are expected to accomplish this without interruption of service and without additional cost to the shipper.

Ports are only one element of the U.S. intermodal distribution system. The whole system, which includes rail, trucking and inland freight hubs, is vulnerable to a looming capacity crisis, as well as to sabotage and disruption. Although more and more cargo is passing through the North American container ports, very little capacity has been added to the entire intermodal freight distribution system. At key choke points in the freight system, highways, rail lines, and ports are increasingly congested because concentration of freight movement has absorbed most of the readily available freight capacity. The U.S. highway system has experienced nearly a doubling of vehicle miles traveled in the past 20 years while the total highway mileage has increased only by 1%.

Similarly, the U.S. rail network, a private sector industry that carries about 40% of intercity domestic freight, has increased the volume of freight it carries by 50% since 1980. At the same time, total available track mileage has been reduced by 35%. In 1999, U.S. rail cargo jumped to 1.72 billion tons, a record high, but still 45% below the projected 2020 volume of 2.5 billion tons. Despite major restructuring and rationalization,

the rail industry now finds itself short of capacity in certain congested metropolitan areas, most predominantly Chicago, and along key mainlines.

Of total domestic freight, about 9% is carried by the MTS on its network of inland waterways and by coastal feeder barges. Yet funding for channel, lock, and levee improvements has, in fact, decreased over the past 20 years.

This study concludes that the U.S. port and intermodal freight transportation system is now being operated in many areas at the limits of its maximum capacity. Should any component of the system break down, more than one-fourth of the national economy will be crippled. Such breakdowns have partially occurred in the past, and will most certainly occur in the future. The paradox is that the United States has significant reserve capacity in its freight transportation system; it is simply located in the wrong place to relieve the most critical choke points. The U.S. lacks a national program for freight transportation planning and development to focus critical scarce resources on the choke points at key gateways and corridors.

Further, this study concludes that there is no coordinated approach to an "intermodal system" as such. Rather, transportation planning takes place at the Metropolitan Planning Organization (MPO) level with little regard for national transportation priorities. Moreover, this intermodal system is

merely an aggregation of multiple, private and public modes, each of which is stovepiped within its own individual areas of activity. That is, each mode has a vertically integrated information system; vertically integrated planning, development, and management programs; and vertically integrated funding mechanisms with minimal "cross-talk" between modes.

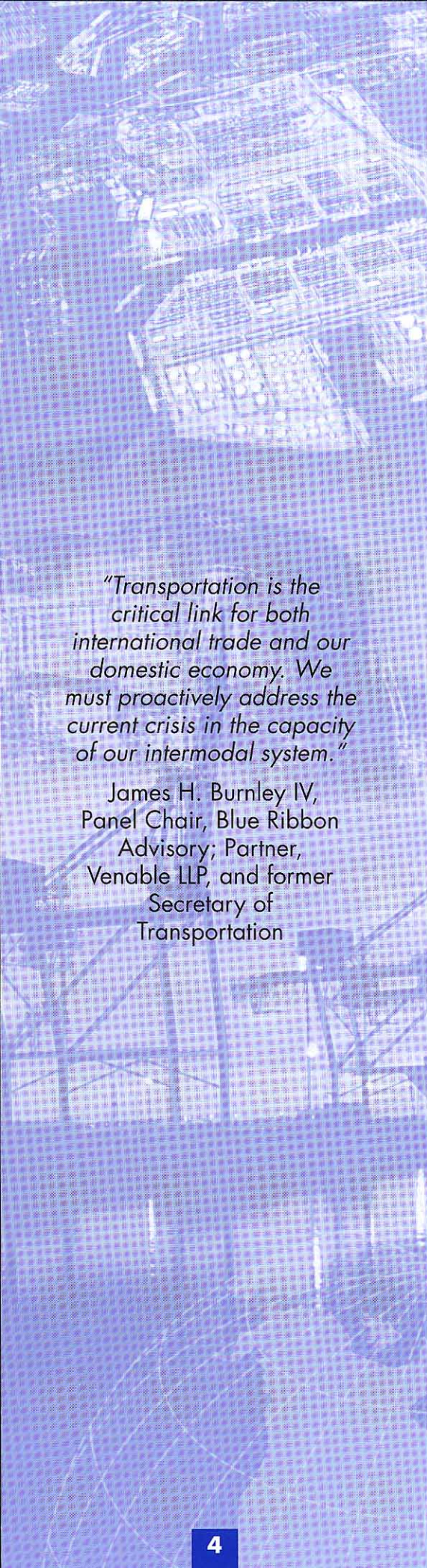
Therefore, there must be a comprehensive, national effort with a joint public/private partnership to unify the modes into a coherent intermodal freight transportation system. This study recommends that the actions described below be initiated as soon as possible.

National Freight Policy

The United States must develop a National Freight Policy that will institutionalize and coordinate a separate freight program within the U.S. Department of Transportation (USDOT) to plan and promote a national intermodal system that relies on timely freight data and effective information technology (IT). To accomplish this, a Federal Freight Advisory Committee must be created to produce specific, targeted results in areas where infrastructure shortfalls have been identified:

- A clearly defined freight program within the USDOT
- A national intermodal planning and development initiative





"Transportation is the critical link for both international trade and our domestic economy. We must proactively address the current crisis in the capacity of our intermodal system."

James H. Burnley IV,
Panel Chair, Blue Ribbon
Advisory; Partner,
Venable LLP, and former
Secretary of
Transportation

- A coherent environmental regulatory process
- Freight data and IT
- Labor integrated into national freight policy

Financing Options

New financing options for intermodal freight infrastructure enhancements must be developed to ameliorate existing and future impediments to an effective intermodal freight system. This study recognizes that its mission is not only to identify one source of funding but also describe the need for funding, and to present funding options. Among these options are expanded eligibility for existing TEA-21 programs, a National Freight Transportation Bank, or a new series of Transportation Bonds.

U.S. industrial strength has been based on rapid, cheap, but dependable freight transport. However, it is an overloaded system, burdened by parochial planning approaches, and outdated labor and productivity standards that are not in step with the dictates of global trading patterns. The facts presented in this study will demonstrate a potential scenario of catastrophic breakdown in the national cargo delivery system. Although some of these findings are troubling, this study documents economic risks to the nation that have been overlooked far too long. It is imperative that these risks be eliminated before the nation's economic stability and its security are jeopardized.

Economic Landscape

ECONOMIC LANDSCAPE

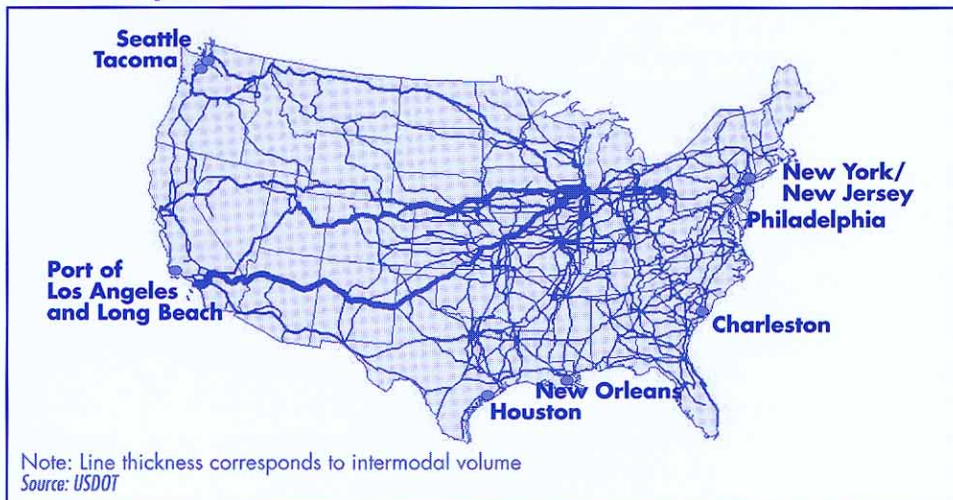
United States industries today are survivors in an increasingly competitive global marketplace. In order to survive, they have to trim margins and increase productivity to levels that would have been unheard of only a few years ago. In the past, U.S. manufacturers and retailers had generous, on-site warehouse buffer capacity for error and uncertainty. Today, industries rely on the logistics supply chain to provide that buffer. Business plans are being developed around short arrival windows, with little on-site storage for cargo arriving early and no reserve for cargo arriving late. At the same time, intermodal shipments are often repacked at the port of entry and dwell an average of four days at the inland terminal. Thus, land requirements for

intermodal terminals are increasing dramatically to support the inventory requirements of their customers.

U.S. Prosperity: Driven by Imports and Exports

The U.S. is the world's most active trading nation, accounting for 1 billion metric tons or nearly 20% of the annual world ocean-borne trade. U.S. international trade in goods and services has grown from 10.7 % of GDP in 1970, to 26.9% in 2002. U.S. trade with Mexico and Canada grew from 26% of the total U.S. trade in 1990, to almost 33% by the end of the decade. All freight, moving in, out, and within the United States amounts to about 15 billion tons, and has a value of \$9.1 trillion. Although the vast majority of freight moves domestically, international

National Impact of Intermodal Goods Flow





trade amounts to \$2.0 trillion, approximately \$700 billion of which is containerized, manufactured goods.

Containerized cargo is generally measured in units equivalent to the volume carried in a 20-foot long container that is 8 feet wide and 8½ feet high. This unit of cargo volume is known in the intermodal industry as a "Twenty-Foot Equivalent Unit" or more commonly, by its acronym, TEU. Every year, the nation's ports import and export more than 26 million TEUs.

The USDOT's Federal Highway Administration predicts that the United States will experience an overall doubling of international freight by 2020. As a result, in less than 20 years, U.S. ports must handle more than 50 million TEUs per year. This will be equivalent to almost 30% of the container traffic in the entire world today. As both domestic and international trade increases, the capacity of America's transportation system must increase in order to sustain and grow the nation's competitive advantage.

A Growing Demand for Containerized Cargo

This immense volume of cargo passes through approximately 35 deep-water U.S. and Canadian ports that connect the U.S. economy with the rest of the world. In response to the current growth in trade, these ports have engaged in a program of expansion and improvement in order to keep up with the

ever-increasing cargo volume. Of the 35 deep-water ports, 16 were investigated in detail by the Study Team. This subset of 16 represents both major and secondary ports on the Atlantic, Pacific, and Gulf coasts. Without exception, all 16 of the targeted ports in the study will experience a substantial increase of at least one-third over their current container traffic volumes in the next 10 years.

Cargo Forecast

To substantiate the premise that these ports would experience growth commensurate with the overall projected increase in trade, a detailed containerized cargo forecast (included in the full version of this study) was prepared for each of the 16 ports. These forecasts were prepared using accepted industry standards for methodology and data collection according to the following steps:

- Establish baseline volumes based on each port's reported container throughput
- Determine econometric forecasts and macro-drivers segmented by trade route and direction
- Synthesize port-specific forecasts based on individual trade lanes served

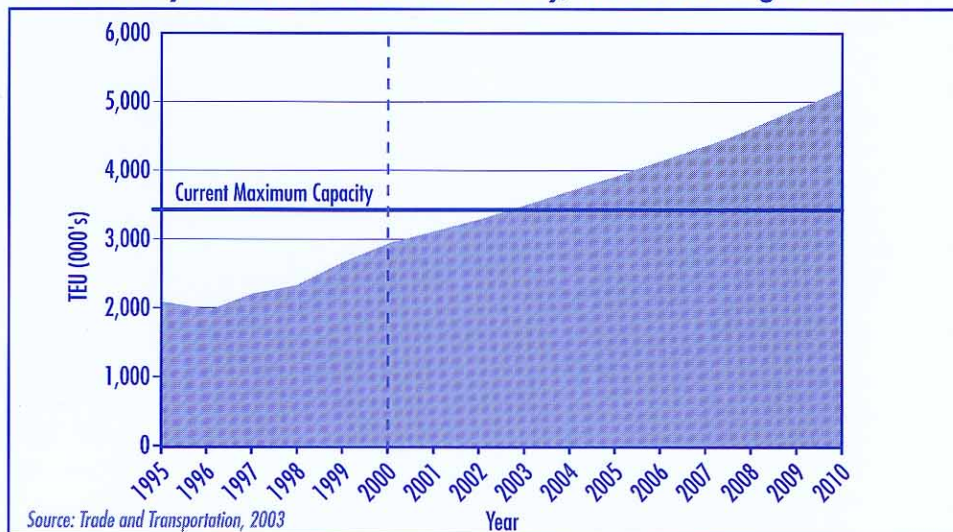
What This Means for U.S. Ports

Fourteen of the 16 ports (88%) will experience at least a 50% increase in container traffic and 3 of the 16 ports (19%) must double in container

terminal throughput capacity in the next 10 years to accommodate the projected cargo growth. However, future expansion of the North American port system requires acquisition of scarce waterfront land that often requires construction of a major landfill. Projects such as shoreline fill for port expansion, waterfront land acquisition, or channel deepening can take up to three decades to permit and construct. The up-front costs for engineering, permitting, and environmental compliance often exceeds the contract amount for performing the actual dredging. Therefore, port improvement is a difficult and very costly process, with the potential for complex and protracted negotiations between the ports and community interest groups.

For example, the Port Authority of New York and New Jersey is predicted to experience a doubling of cargo demand in the next decade, corresponding to a projected 5.4% compound annual growth rate. With about 1,265 acres of active container terminal, operating at an average 2,700 TEUs per acre, the Port Authority must both increase its land area, as well as enable its operators, to increase productivity. By 2010, terminal productivity is projected to be about 3,800 TEUs per acre, leaving the Port Authority to find another 400 acres of New York Harbor waterfront for terminal development. To achieve 3,800 TEUs per acre, the Port Authority is planning to develop a Port Inland Distribution Network (PIDN) in New Jersey, with dedicated rail and truck corridors connecting to the marine terminals.

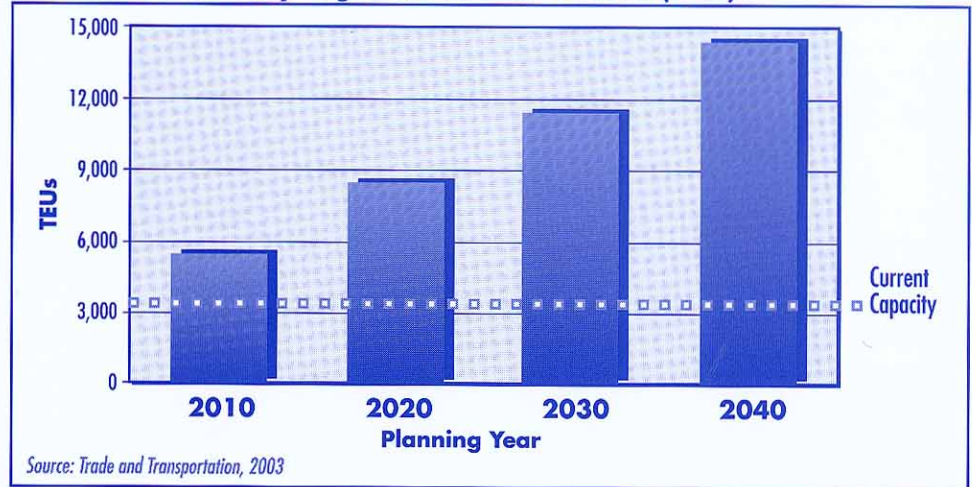
Port Authority of New York and New Jersey, Year 2010 Cargo Forecast



Myth: The Highway Trust Fund provides all the necessary funding to address the nation's transportation problems.

Fact: The Highway Trust Fund is inadequate to address even highway and transit needs.

New York/New Jersey Regional Container Forecast (TEUs)



Acquiring 400 acres of New York Harbor waterfront will be both expensive and politically difficult.

Looking even farther into the future, these problems only worsen. The Port Authority of New York and New Jersey developed internal projections out to the year 2040 to investigate the marine terminal development needed to accommodate the projected increases in cargo demand. These projections show that port volumes could nearly triple by the year 2020 and increase by a factor of four or even five by the year 2040.

On the West Coast, the situation is even more daunting. Current forecasts for the ports of Los Angeles and Long Beach predict a compound annual growth rate for containerized cargo of 6.2% under low growth (continuing Asian economic recession) assump-

tions. Even this conservative growth scenario will result in a tripling of Southern California cargo demand by the year 2020. The Port of Long Beach anticipates that it will have no available land for expansion after 2006.

Ship Size and the Impact on Ports

Container ship size has experienced unbelievable growth since the introduction of 1,000 TEU vessels in the mid-1960s. Although the maximum ship size was predicted to be no more than 3,500 TEUs, the latest ships calling at North American ports have a functional capacity of almost 8,000 TEUs, and this upward trend in ship size is expected to continue. Recent foreign shipyard orders have been placed for several new vessels having capacities exceeding 9,500 TEUs for delivery as soon as 2004. Moreover, advances in propulsion and hull design will allow a 15,000 to 18,000 TEU

containership to be constructed within the next two decades.

The deployment of larger ships clearly presents new challenges for terminal expansion, terminal productivity, and improved landside access. The most significant changes in the service pattern and ship size are expected on the Atlantic Coast. Currently, the Atlantic Coast ports receive ships of up to 4,500 TEU capacity. These same ports must soon be prepared to handle vessels that are almost twice this size.

The main driver behind this phenomenal growth in ship size is the commercial market, which has demanded faster delivery times at lower and lower costs to the shipper. The only way to accommodate this demand is through the scale economies derived from larger containerships. In other words, larger ships enjoy considerably lower unit costs. In general, the unit cost of a 6,000 TEU ship is less than half the operational cost of a 1,000 TEU ship. Beyond 6,000 TEUs, a size increase of 300% (6,000 to 18,000 TEUs) results in a cost decrease of only 15%. However, with carrier profit margins hovering in the 3% to 5% range, a cost saving of 15% can still be dramatic.

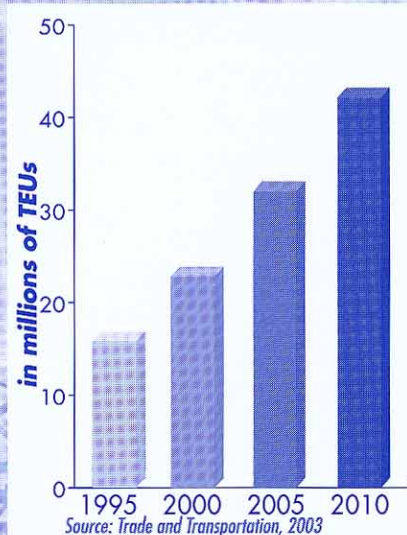
The bottom line for the U.S. economy is that lower ship operating costs and vessel-sharing agreements keep the costs of global production and distribution low. Because of these economies of scale, the average annual cost of transporting all of

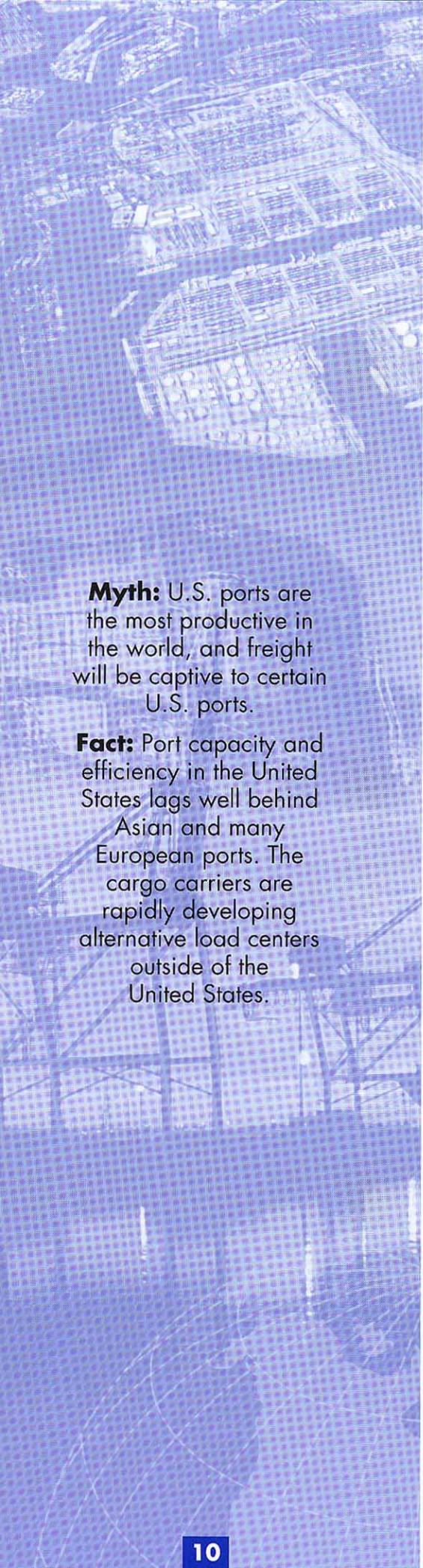
America's containerized imports is only \$133 per household.

Despite the economies of the new, larger ships, they will have a significant impact on marine terminal infrastructure. Investments in new technologies will be required to effectively service these larger ships, and terminal operating costs may increase at the ports where they call. For example, servicing one of these large ships can require three or more shifts of labor, resulting in substantial overtime payments. In addition, there will be expenses for increased queuing time to load the larger ships, and there will be additional surge capacity to effectively move the cargo off-terminal. Therefore, the impact on the nation's ports will be severe, resulting in the concentration of loads at selected ports and inland intermodal terminals.

However, the greatest impacts of mega-containerships will likely be seen on the inland cargo distribution infrastructure. These larger ships will tend to call at specialized load centers that have the ability to service them. Therefore, distribution of cargo from these load centers will place a tremendous burden on the inland intermodal system. Moreover, these strategic load center ports are being developed in the very locations where reserve port and inland capacity are scarce.

Historical and Projected Container Traffic for the Targeted Ports





Myth: U.S. ports are the most productive in the world, and freight will be captive to certain U.S. ports.

Fact: Port capacity and efficiency in the United States lags well behind Asian and many European ports. The cargo carriers are rapidly developing alternative load centers outside of the United States.

Freight Transportation and the Economy

While the importance of freight transportation to the national economy has never been in doubt, the true magnitude of the nation's dependence on a reliable, cost-effective system for the distribution of goods is not well-understood by the majority of people. It is said that "freight doesn't vote," yet the international movement of containerized goods represents almost a trillion dollars in value passing through the U.S. ports. This value enters the

economic system as the "raw material" for the retail sector or as "extended factory," supplying critical components to the manufacturing sector. At the same time, a cost-effective and efficient intermodal system is crucial to U.S. companies that depend on exports to foreign markets for their products.

The ports examined in this study function not in isolation, but rather as critical gateways that allow imports and exports to fuel North America's prosperity. When linked to highways and rails, the nation's marine container

Sample Ports With Port Range and Tonnages

Sample Ports	Tons** All Cargo	TEUs* Containers
Charleston, South Carolina	2,250,000	1,600,000
Galveston, Texas	6,900,000	100,000
Halifax, Canada	14,000,000	500,000
Houston, Texas	117,000,000	1,000,000
Long Beach, California	124,800,000	4,600,000
Los Angeles, California	113,900,000	4,900,000
Mobile, Alabama	19,400,000	100,000
New Orleans, Louisiana	33,600,000	300,000
New York/New Jersey	73,500,000	3,000,000
Norfolk, Virginia	24,000,000	1,300,000
Oakland, California	24,400,000	1,800,000
Philadelphia, Pennsylvania	4,600,000	200,000
Port Everglades, Florida	23,700,000	500,000
Seattle, Washington	17,000,000	1,500,000
Tacoma, Washington	15,600,000	1,400,000
Vancouver, Canada	76,600,000	1,200,000

* Source: Containerization International 2002 (rounded TEUs) ** Source: APA 2002 Directory

ports form an integrated system for intermodal freight transportation.

Freight transportation shapes cities, underpins the economy, and determines U.S. trade patterns. Better freight transportation reduces the cost of doing business, and improves the nation's standard of living. It is America's link to the global economy. Highly coordinated freight operations, moving through efficient seaports for final delivery via trucks, trains, and planes, deliver the materials upon which the U.S. and its trading partners rely. These raw materials and finished consumer goods could become unobtainable at today's cost and quality without a focused plan to sustain and grow the nation's freight system. The economy depends upon freight transportation to bring textiles from India, shoes from Taiwan, fruit from Central America, computer components from Asia, oil from the Middle East, and automobile components from Japan. Moreover, not only is a robust freight transportation system necessary for commercial purposes, but also efficient freight movement is more essential than ever for national defense and security.





The North American Intermodal System: Integral to Global Competitiveness

THE NORTH AMERICAN INTERMODAL SYSTEM: INTEGRAL TO GLOBAL COMPETITIVENESS

The U.S., the world's premier trading nation, should aggressively embrace a strategic approach to ensure adequate freight capacity managed in a systemic response to global supply chains. Regrettably, such a system does not yet exist. In 1990, when USDOT Secretary Norman Mineta was a U.S. congressional representative, he said, the following:

There has never been a coherent, coordinated, and comprehensive national transportation policy that includes highways, transit, rail, airports, and seaports as part of a greater whole. And it is our greatest challenge here in the 1990s to start thinking and planning in terms of that greater whole.

The Study Team fully endorses the inherent challenge in Secretary Mineta's call to start addressing the greater whole of an intermodal system. It recognizes that efficient global freight movement is no longer transport mode-specific, but rather that freight movement is best understood and managed as a global supply chain.

Domestic to Global

Since the 1960s, globalization has substantially changed the structure of the U.S. economy. In 1960, the value of trade in the U.S. ran at about 9% of the GDP. Today, as a result of a rapidly evolving global economy, the value of trade has increased to 27% of the GDP. The continued process of globalization is expected to increase the value of trade to as much as one-third of the GDP in the next 20 years. In anticipation of this continuing evolution, the nation must provide adequate intermodal freight infrastructure to truly manage global trade.

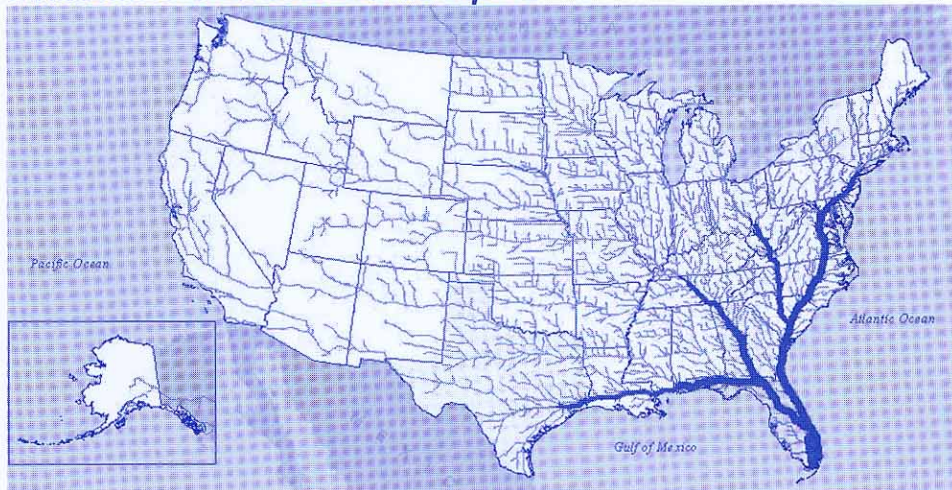
The globalization of markets is having a tremendous impact on where goods are produced or sold, and is the reason that a speedy and reliable system for freight movement is an unquestionable strategic competitive advantage. Globalization has substantially changed the structure of the national economy. A key trend in the production of goods has been a shift from vertically structured production enterprises, where centralized manufacturers both produce and distribute their product, to a horizontally integrated production process where firms outsource many of their functions, including distribution. Therefore, the existing vertically structured modal freight infrastructure must also become horizontally integrated into an effective intermodal freight system.

Truck Distribution of California Imports



Source: FHWA Freight Analysis Framework

Truck Distribution of South Florida Imports

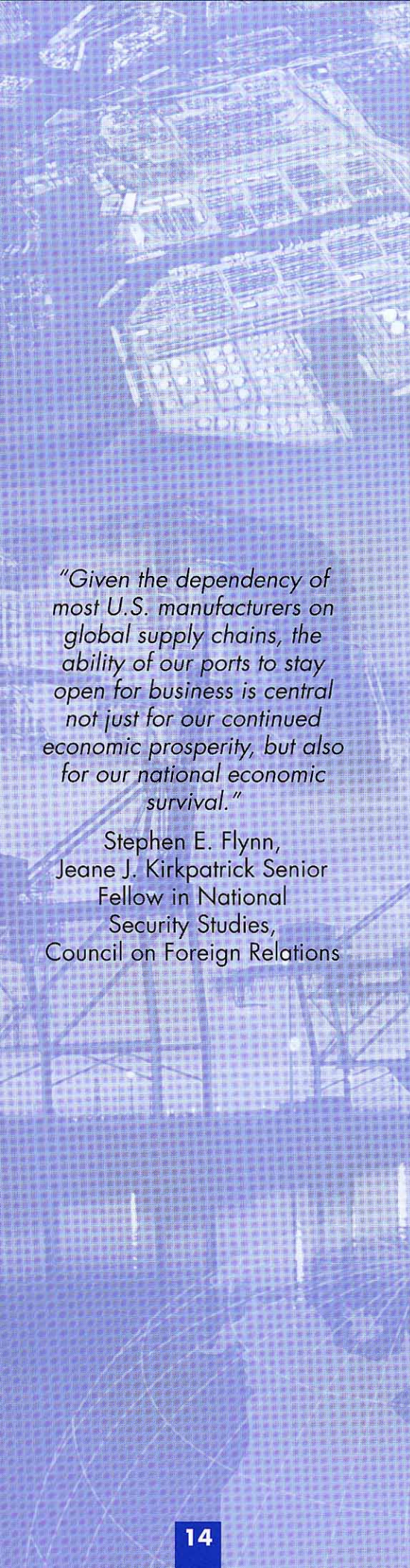


Source: FHWA Freight Analysis Framework

Imported cargo entering U.S. West Coast ports can be distributed all the way to Maine. At the same time, some imports entering South Florida ports can make their way to Alaska.

Myth: Local barriers to port efficiency should be addressed locally.

Fact: Ironically, the dynamics of global logistics can create bottlenecks that exist thousands of miles away from a port.



"Given the dependency of most U.S. manufacturers on global supply chains, the ability of our ports to stay open for business is central not just for our continued economic prosperity, but also for our national economic survival."

Stephen E. Flynn,
Jeane J. Kirkpatrick Senior
Fellow in National
Security Studies,
Council on Foreign Relations

Value of Efficient, Fast, and Reliable Global Sourcing

Several key economic trends underpin the future direction of modern economies and drive the need for targeted investments in intermodal gateways and corridors:

- Inexpensive labor production costs and the value of time will drive decisions of the most effective producers of goods.
- Producers of goods will continue to demand efficient, low-cost, and reliable freight transportation, and will increasingly demand faster, just-in-time (JIT) freight transportation.
- Globalization will continue to drive more imports and exports. Industry will continue to redefine itself, new industries will emerge, and old industries will fade; boundaries between producers, suppliers and carriers will continue to blur.
- JIT shipping impacts warehousing and distribution. Businesses are in an evolutionary shift from "push" to "pull" supply chain logistics management. "Pull" logistics relies less on maintaining expensive inventories and favors more accurate reliable transport to move goods. To compete globally, North American ports must become a value-added multiplier in this rapidly evolving intermodal logistics chain.
- Information technology innovations, such as supply chain management software, promise to further improve freight movement efficiency, but at a steep cost. Spending for intermodal tracking technologies (in-transit visibility) is estimated to quadruple from \$125 million in 2000, to \$515 million in 2005.

The Security Imperative

THE SECURITY IMPERATIVE



Source: *Trade and Transportation*, 2003

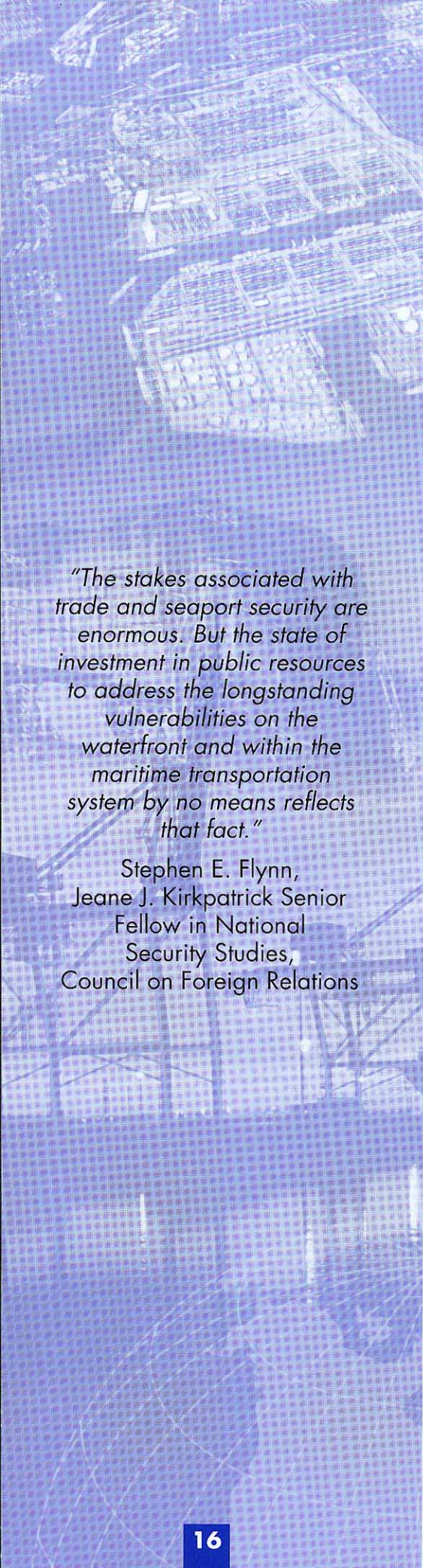
In the past, the majority of transportation security efforts were directed at protecting cargo from theft and interdicting contraband. However, ports have historically been the target of deliberate damage, as witnessed during the waterfront labor unrest in the 1930s, and the burning of the *Normandie* at her New York berth in 1942. Consequently, marine terminal security guards are trained to watch for sabotage in addition to theft, and most security efforts have been designed to prevent intrusion and damage on the port property. However, since the September 11th attacks, this focus must shift to the prevention of incidents that are intended to disrupt the nation's

economy and commerce or to harm its citizens beyond the marine terminal gates. This potential for economic disruption is the hidden threat to the nation's security that is yet to be answered by various proposed security initiatives.

U.S. Military Intermodal

At the same time that ports are being called upon to tighten their security, they are also preparing to support military operations overseas. During the Gulf War, the Military Traffic Management Command mobilized the equipment for six U.S. divisions through 24 U.S. ports over a period of six months. Including the sustainment phases, this massive campaign loaded more than 945,000 pieces of equipment—equaling 6.5 million tons—onto 564 ships bound for Saudi Arabia. During the Gulf War, U.S. commercial ports accommodated both military deployment cargo and normal commercial cargo with minimal delays and disruption. Had the economy been stronger or the deployment timelines shortened, the results may have been different.

Ten years later, the Department of Defense (DoD) has set a target for deployment of five divisions in only 75 days, an 80% reduction in deployment



"The stakes associated with trade and seaport security are enormous. But the state of investment in public resources to address the longstanding vulnerabilities on the waterfront and within the maritime transportation system by no means reflects that fact."

Stephen E. Flynn,
Jeane J. Kirkpatrick Senior
Fellow in National
Security Studies,
Council on Foreign Relations

time. During the Gulf War, entire marine terminals were given over for military deployment. The commercial cargo was diverted to other ports, and somehow reserve capacity was developed for this diversion. Since that time, the military has reduced its overseas military presence, reduced U.S. military ocean terminal infrastructure, reduced deployment timelines, and has become more dependent on the U.S. commercial transportation industry.

In addition, the DoD has set a future goal of full mobilization in one month, a further 60% reduction in time available for deployment. Without revolutionary improvements in port operations and productivity, the next emergency military mobilization has the potential to significantly disrupt commercial port operations.

These demands present challenges and opportunities. A number of programs are under way to address these challenges through the introduction of technology and greater partnering between the DoD, the USDOT, and the commercial transportation industry. One program that helped coordinate U.S. port activities during the Gulf War is the National Port Readiness Network. This program coordinates military mobilization requirements with marine terminal resources to minimize disruptions to the commercial transportation system.

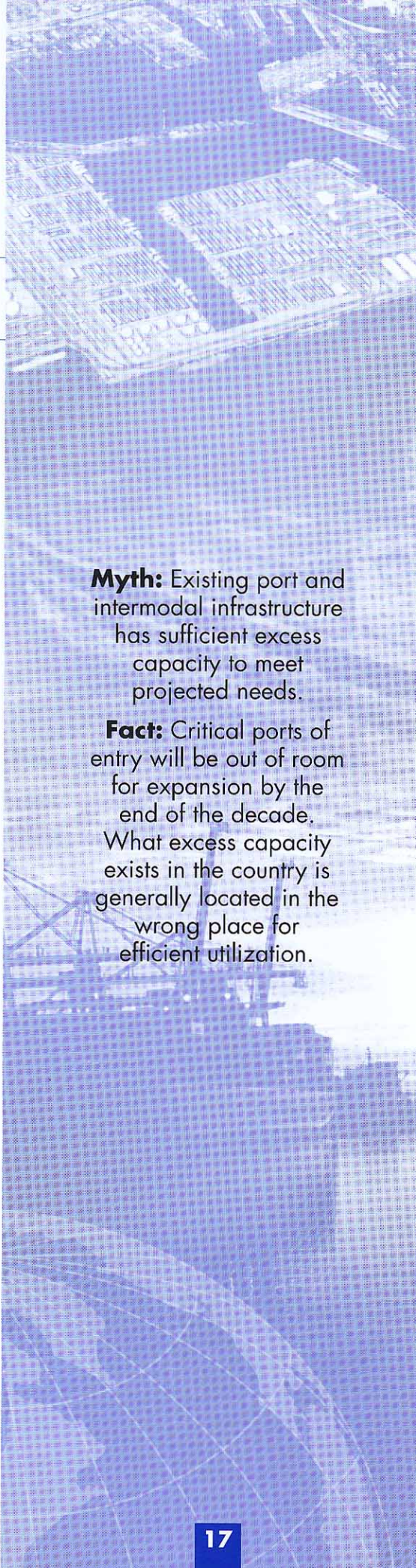
Port Security

Many respected experts refer to seaports as the most glaring gap in America's defense against terrorism. Liberalized trade and increased speed in the movement of goods fostered the global economy, and sustained unprecedented prosperity in the 1990s. Today, there is an alarming dark underside to that globalization trend. Port security expert Stephen Flynn, with the Council on Foreign Relations, has observed that an unintended consequence of the growth of globalization is that the intermodal system now also presents the possibility of moving contraband and criminals effectively and efficiently. This fact produces an enormous new national security issue for North American ports.

The events of September 11th have shown just how quickly the U.S. economy could be brought to its knees if the government is forced to blockade goods to ensure national security. Just days after the attack on the United States, Daimler Chrysler and Ford Motor Company announced they were shutting down numerous car assembly plants for lack of critical parts produced in Canada and purposely delivered on a JIT basis to keep expensive inventory costs in check. The Canadian parts became stuck in an 18-hour traffic jam at the newly secured border crossings.

Additionally, a number of oil tankers were barred from U.S. ports, and the country discovered how quickly the densely populated Northeast could run out of fuel and heating oil. According to Stephen Flynn, Los Angeles was within days of running out of drinkable water because train shipments of chlorine, a hazardous material critical to water purification, were halted.

This threat is very real. In a recent study, *Protecting the Homeland*, the Brookings Institution warned that a doomsday scenario attack on the maritime system, using nuclear devices concealed in a container, could cause damage and disruption that could cost as much as \$1 trillion. Again, ports cannot stand alone in this challenge; it must be addressed in the context of a total transportation system. Otherwise, risks will just move to the weakest link. Security must be tackled on an equal footing with efficiency and speed.



Myth: Existing port and intermodal infrastructure has sufficient excess capacity to meet projected needs.

Fact: Critical ports of entry will be out of room for expansion by the end of the decade. What excess capacity exists in the country is generally located in the wrong place for efficient utilization.



The North American Intermodal System

THE NORTH AMERICAN INTERMODAL SYSTEM

An Intermodal Paradox

Ports are but nodes of a national rail and highway network that has, over the past few decades, been the model for the rest of the world. Today, the model status of the U.S. intermodal system is in jeopardy because a focused national investment strategy to enhance key corridors and gateways has not been created. Simultaneously, this nation is experiencing the best of times and the worst of times for the U.S. intermodal system. How can this be? To understand this paradox, one has to understand the efficiency of the long haul (which applies to ships, trucks, and rails), and the inefficiency or crisis of the "last-mile problem." In short, each mode has done what it does best: maximize efficiency by achieving great economies of scale on the long haul. This is the business response to providing low-cost global transportation, and it has been achieved by each individual mode where spaces are open and capacity is abundant.

Where the system is at a crisis point is at the urban freight hubs (seaport, rail, or truck terminal), and along the high volume corridors. Where the "efficient" modal carriers come together with

high-cargo volumes under surge conditions, infrastructure costs are enormous. It is at these intermodal choke points where national leadership and attention are desperately needed.

Ports: Gateways for Global Trade and Competitiveness

Ports are critical links in the supply chain, and the significant gateway ports must continuously be renewed through a program of strategic public and private investments to maintain adequate capacity and an acceptable level of service. In addition, the ports' intermodal rail and truck infrastructure also requires strategic investment to keep the supply chain functioning and the freight moving. Consider these facts surrounding the ports in this study:

- By 2004, 6 of the 16 ports (38%) must add substantial capacity in order to maintain minimum levels of acceptable service to compete in the global economy.
- In five years, one-quarter of all U.S. gateway ports will experience a 25% shortfall in containerized cargo capacity.
- In less than seven years (2010), 12 of the 16 ports (75%) must add extensive new terminal capacity.

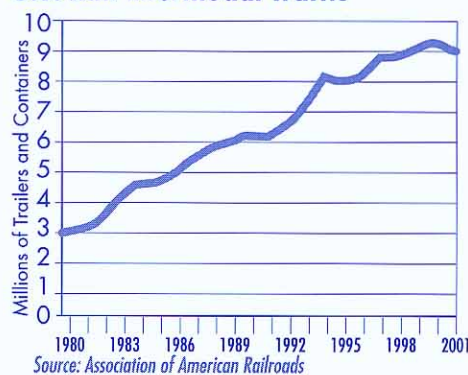
- If permitted land is available for port or intermodal terminal expansion (often, it is not in major urban areas), major capital projects can take from three to six years.
- As rapid growth in world trade and containership size continues, load center ports and their associated business supply chains will be under pressure to efficiently handle the resulting increased volumes.
- The strength of the national economy and security is becoming increasingly interdependent on robust freight transportation. Intermodal freight demand is forecasted to grow over the long-term at approximately 4.5% per year, or 25% in only five years.
- Key corridors between the West Coast and Chicago or the Southeast have recently experienced growth rates in excess of 8.0% per year, with sustained growth rates projected to be about 6.5% annually.
- The San Pedro Bay ports of Los Angeles and Long Beach have given growth projections that range between 7.0% and 8.0% per year, increasing almost 50% in the next five to six years.

Rail Intermodal: Port Partners and Efficient Corridors for Freight Distribution

Concurrent with the growth of container traffic through key ports has

been a dramatic increase in rail intermodal. Intermodal freight has been the fastest-growing segment of traffic for the U.S. railroad industry over the past decade. U.S. rail intermodal has grown from 3.1 million units (trailers and containers) in 1980, to nearly 9 million units in 2001. Intermodal now accounts for about 20% of the revenue for the major railroads. Half of that intermodal traffic is international, meaning that the container moving on rail has moved in or out of a seaport.

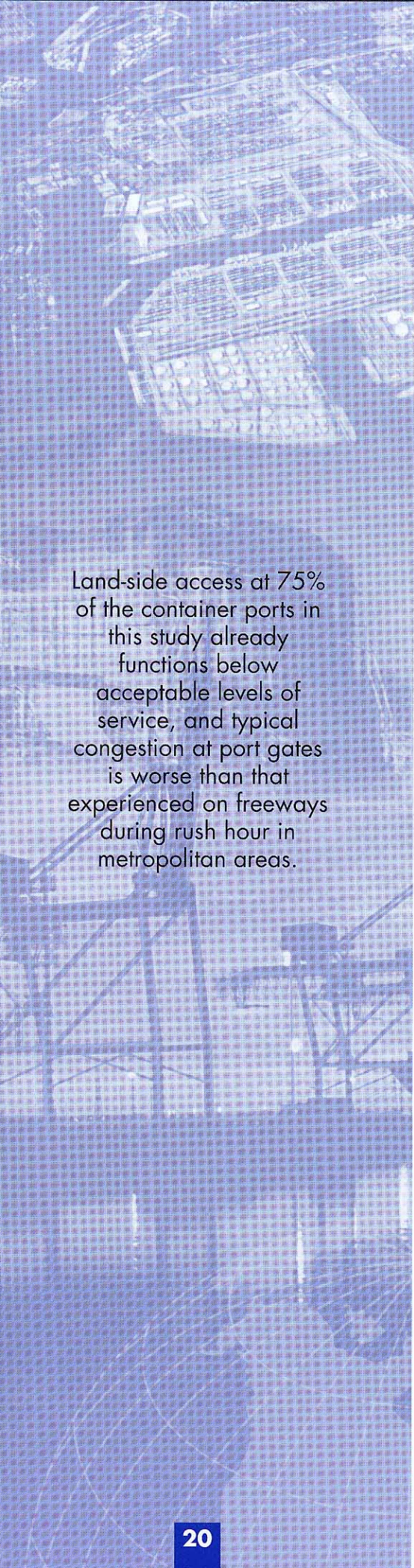
U.S. Rail Intermodal Traffic



Today, rail intermodal moves are highly dependent upon efficient on-dock intermodal terminals where rail traffic can move seamlessly from the ship to the rail car. This requires huge capital investments, careful planning, and adequate on-port and near-port land. Intricate institutional arrangements must be forged to manage such complex projects. Many are most familiar with the Alameda Corridor, the "showcase" intermodal project using public and private financing. While the Alameda

Myth: The private sector will carry the financial burden of keeping our intermodal system functioning at optimal capacity.

Fact: The individual private-sector modal operators cannot optimize the "system", rather, they can create a collection of well functioning modal components, that need to be knit together.



Land-side access at 75% of the container ports in this study already functions below acceptable levels of service, and typical congestion at port gates is worse than that experienced on freeways during rush hour in metropolitan areas.

Warning Signals: Intermodal System at Risk

In the fall of 1998, the intermodal rail system in this country almost froze. There are many who would argue that it did freeze, and that the rail carriers, the ports, and the motor carriers were powerless to do anything about it. For a few critical weeks, cargo piled up on the docks in Southern California while manufacturers scrambled to keep their plants open despite critical shortages of components and raw materials.

Trucking firms scrambled for drivers, attempting to clear the jammed ports and to fill the transportation capacity gap. Marine terminal operators opened their gates earlier and maintained longer yard hours to accommodate the surge of truck arrivals. Cargo was diverted to Canadian terminals or transshipped to less congested ports. Meanwhile, rail operation managers across the country worked night and day to resolve the congestion problems.

And it worked, this time. There was no lasting economic crisis. Brake assemblies finally arrived to become part of the new model Chevrolets and Toyotas, and Nike shoes eventually arrived at the stores in time for Christmas. This time the system was able to recover. With freight volumes increasing, rising congestion at key ports and corridors, and mounting security procedures, can the U.S. intermodal freight system continue to respond?

What happened in the fall of 1998 was only a precursor to what could happen if the transportation grid blacks out again. If delays stretch for months, and factories close their doors because needed components are not available, then jobs will be lost. These jobs may not return in full for decades, and the nation will come to the realization that, although freight doesn't vote, jobs do.

Corridor is a proud national achievement, many other large intermodal projects also require urgent attention.

Improved intermodal access to key ports would greatly enhance port efficiency. Furthermore, growth in the usage of on-dock, intermodal rail could generate significant environmental dividends by reducing local street congestion, reducing expensive new highway connectors, enhancing highway safety, lowering overall emissions, and increasing fuel efficiencies.

However, some in the railroad industry contend that freight revenue alone may not be sufficient to provide an adequate return on capital needed to privately fund full development of the rail intermodal potential. National assistance will be needed in the coming years to help integrate private railroad infrastructure with the highway and marine transportation modes.

Intermodal Trucking: Essential Port Partners on Every Ton of Cargo

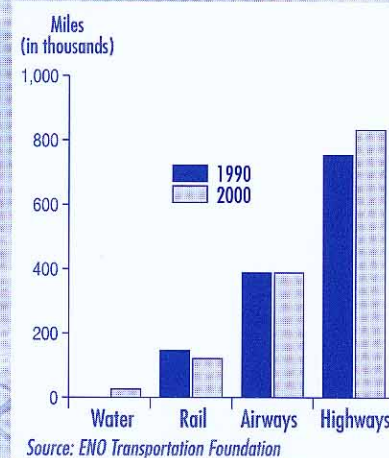
The trucking industry is the backbone of the domestic distribution system. According to the Eno Foundation, 81% of domestic intercity freight transportation expenditures in 2001 were for trucking. The so-called last mile problem is the greatest challenge facing intermodal truckers today. The last mile in and out of high-volume terminals can require more time and resources than any other portion of the trip. While large volumes of cargo are off-loaded at the seaport,

moving that cargo out of the gate and connecting it to a global supply chain requires intermodal highway connectors and dedicated financing to improve them. Intermodal connector projects can no longer languish as "chance" projects on Metropolitan Planning Organizations' (MPO) transportation improvement program schedules.

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), specifically cited the problem of inadequate intermodal connectors and the lack of an investment program to upgrade these connectors. The Federal Highway Administration (FHWA) has conducted many studies on the condition of intermodal connectors; nonetheless, the 517 connectors cited in the studies remain orphan projects and will remain so unless there is dedicated funding to improve them. Furthermore, the National Highway System (NHS) report sent to Congress in June 2000, documents that these 1,222 miles of connector roads are in far worse condition and receive less funding than other NHS routes.

Unfortunately, 10 years and countless studies since the advent of ISTEA, there has been no measurable progress made toward improving intermodal connector efficiencies in the United States. Further, the Travel Rate Congestion Index published by the Texas Transportation Institute (TTI) shows that peak travel times have increased significantly in major metropolitan areas, areas where the subject

Intercity Transportation Infrastructure Mileage Trends





seaports and other intermodal choke points are located. According to the FHWA, landside access at 75% of the container ports in this study already functions below acceptable levels of service, and typical congestion at port gates is worse than that experienced on freeways during rush hour in metropolitan areas.

Short Sea Shipping: A Capacity-Building Option to Be Developed

Short sea shipping encompasses both inland distribution/feeder services (for ports located at the mouth of major rivers, such as New York and New Orleans, that can serve inland locations) and coast-wise feeder services to distribute imports received at a gateway port to other ports along the coast. In addition to providing feeder service to hub ports, these coast-wise domestic intermodal services must be explored as an option to add freight capacity in highly congested areas. Short sea shipping could provide benefits to multiple stakeholders, but its ultimate success will depend on cooperation among truckers, ports, carriers, shipbuilders, the military, and governments to identify and develop additional commercially viable services.

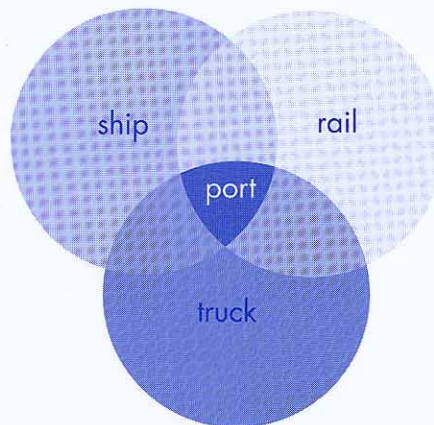
System Weaknesses

SYSTEM WEAKNESSES

A complex combination of U.S. economic growth, explosive levels of electronic commerce innovations, and load centering at key freight hubs collectively drive the interrelationships between ports, railroads, and intermodal trucking. Additionally, crippling levels of urban congestion are issues for both freight and the individual traveler. There is no doubt that enhancing freight capacity produces public, private, and defense benefits. The nation's "built" freight infrastructure was incrementally developed in response to various economic phases and modal epochs. It reflects the realities of earlier economic eras. Today, fundamental and difficult questions about the U.S. modal infrastructure must be answered in order to respond to the realities of the new global economy.

- Does the U.S. have a freight transportation policy that responds to a global economy?
- Does the U.S. have a focused strategy to accommodate projected growth in freight volumes?
- Can the U.S. retain its current dominance in global trade without strategically addressing the choke points in its national intermodal system?

There are many warning signs that point to shortfalls in port and intermodal capacity. Perhaps the principal question is: What will happen if plans are not made today for tomorrow's freight realities?



Source: Trade and Transportation, 2003

Fault lines in Intermodal Connectivity

Forty-five years ago, when Malcolm McLean first put containers on ships, there was little thought of an "intermodal system." In fact, Mr. McLean was a trucker who only wanted to make sure that his cargo arrived undamaged and on time. By 1980, when American President Lines introduced double-stacked train service to the Midwest, the first concept was born of a

Myth: The United States, like all other developed nations, has a freight investment policy that fosters the nation's global competitiveness.

Fact: All freight investments in the United States are mode-specific, with little direction or communication between the modes.



If union labor is not proactively engaged in improving terminal operations, then no amount of technology will achieve the level of cargo handling productivity required for the future.

transcontinental freight service that could freely make use of three modes of carriage: ships, trucks and rail. The result was the first truly intermodal freight service in the United States. International containerized liner services now carry cargo valued at over \$4 trillion per year, and every Class 1 railroad in the nation is now heavily involved in transporting containerized intermodal cargo. However, this service was born of need and developed piecemeal; it still does not represent a true integration of the modes.

In the intervening 20 years, many carriers have entered the intermodal market. Shippers refer to a "seamless intermodal system" where IT allows cargo to be dispatched by the cheapest, most efficient means available. Despite this revolution in the way cargo is carried and distributed, there has never been a true integration of intermodal infrastructure. Improvement of intermodal connectors as an important priority was identified in the 1991 ISTE, but improvements have been very slow, and funds have not been dedicated for connectors.

Fault Lines Between Information Systems

Twenty-four hours a day, seven days a week, and 365 days per year, intermodal freight services using state-of-the-art, IT systems have dramatically changed the architecture of North American intermodal freight services. Yet these systems were also built

piecemeal, resulting in layer upon layer of so-called legacy systems that do not communicate well with each other. In practice, dispatch information is not generally shared between modes, and a paper transaction is required every time an interchange occurs between carriers. The systems of the various carriers, terminal operators, port authorities, and third parties are still only vertically integrated or stovepiped within each individual mode.

A more pernicious problem is one of in-transit rerouting in which shippers wait to make their routing decisions until the last possible minute in order to accommodate changing market strategies or customer demands. In-transit rerouting makes the JIT delivery of goods possible, but it also makes it impossible for shippers to share the final destinations of their cargo with the carriers.

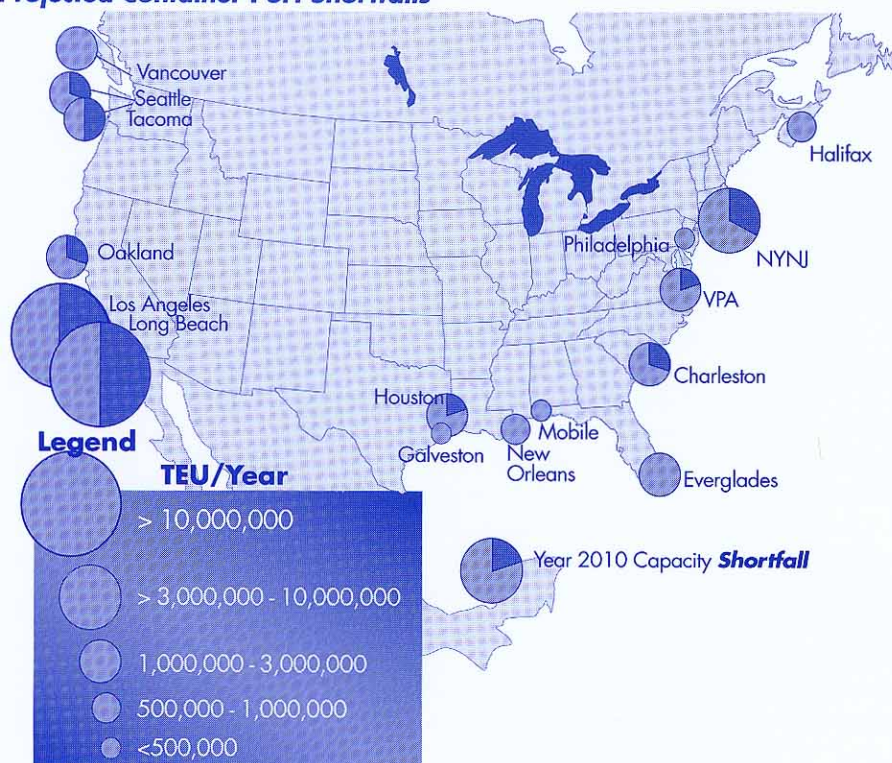
Fault Lines Around Labor Resources

Malcolm McLean's containerization concept revolutionized waterfront labor practices. Break-bulk shipping was the norm prior to containerization, and direct handling of each piece of cargo moved on or off a ship was enormously labor-intensive. Post-containerization—and a Memorandum of Agreement between the International Longshore and Warehouse Union (ILWU) and the Pacific Maritime Association (PMA) in 1965—waterfront man-hours per ton dropped

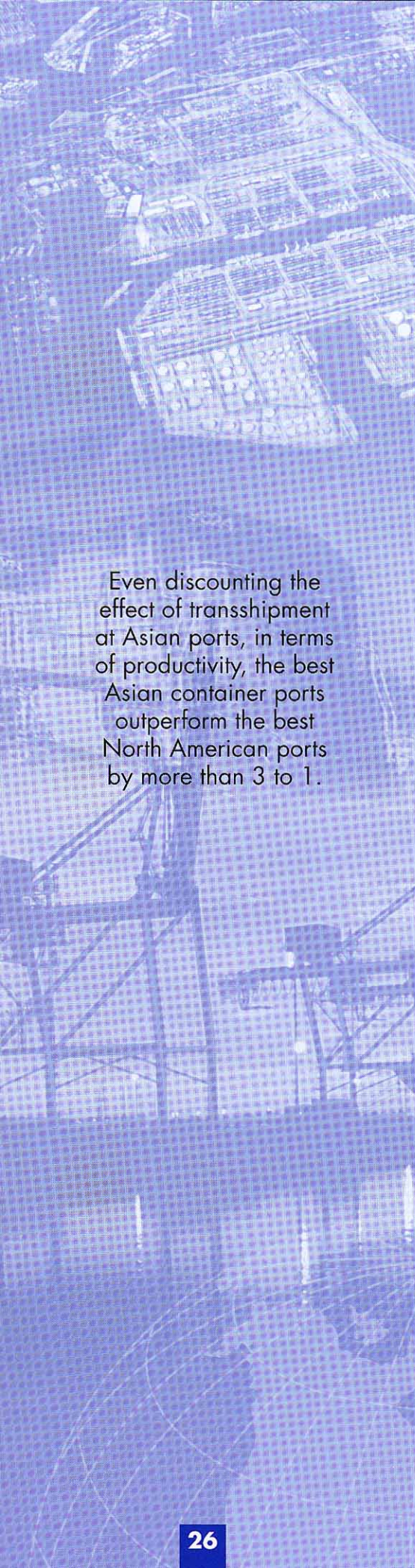
by 30%, while cargo volumes increased by 40%. At the same time, compensation and worker benefits rose to some of the highest levels of any labor category in the country. Full-time, West Coast longshore salaries for union registered workers currently average \$106,833 per year, with annual employer paid benefits costing an additional \$42,000 per employee.

Similarly, the International Longshoremen's Association (ILA), representing the East Coast longshore workers, has signed agreements that entitle their members to generous wages, benefits, and employment guarantees. Understandably, these wages and benefits attract many prospective members to the longshore unions. However, the ILWU and the ILA have attempted to

Projected Container Port Shortfalls



Source: Trade and Transportation, 2003



Even discounting the effect of transshipment at Asian ports, in terms of productivity, the best Asian container ports outperform the best North American ports by more than 3 to 1.

eliminate swings in job availability by limiting membership in their unions. This practice results in full employment for longshore workers. However, it often leads to a periodic shortage of available workers, which must be covered by overtime labor or lowered productivity.

Another major problem is the lack of a steady workforce: a nucleus of people who work for the same company every day, and are capable and willing to perform a multiplicity of tasks. Although the need for a skilled, highly trained workforce can best be filled by permanent employees, workers are still obtained from the union hiring hall, with a significant number of them being rotated to different terminals. This practice ensures full employment for each union worker, but it contributes to a lack of organization and continuity within the marine terminals.

Forty years after the advent of containerized cargo, management and unions are still struggling with issues of job security, productivity, and technology implementation. Currently, IT is at stake, with the shipping lines and terminal operators requesting electronic data interchange to improve cargo processing time and the union insisting on hand entry by union clerks. The real issue is productivity. Infrastructure, operations, and technology notwithstanding, if union labor is not proactively engaged in improving terminal operations, then no amount of technology will achieve the level of cargo-handling productivity required for the future.

Most terminal managers agree that the single critical factor distinguishing two port cities in the same market is the quality and productivity of the available labor. North American longshoremen are the highest paid in the world, yet are seldom integrated into the calculus of infrastructure improvement and intermodal management plans.

Fault Lines Around Terminal Productivity

In terms of productivity, the best Asian container ports outperform the best North American ports by more than 3 to 1. Even discounting the effect of transshipment at Asian ports, the best North American port terminals would have to double their productivity to keep pace with the best Asian terminal operations. In North America, the average West Coast ports are more than twice as productive as the average East Coast ports. This is due primarily to Pacific Rim trade patterns and to the integration of modern rail intermodal technology.

These productivity measures are usually given in terms of annual TEU per gross terminal acre. As permitted land is often the limiting component for terminal development, this metric evaluates the efficiency with which a marine terminal uses its scarcest resources. However, it does not take into account market conditions, shipping schedules, or the presence of transshipment cargo, that can almost double the per acre productivity of a terminal. By this

measure, the most productive Asian ports move about 10,000 to 15,000 TEUs per gross terminal acre if transshipment is discounted (over 25,000 TEUs per acre if transshipment is included). In contrast, the best West Coast ports produce at the rate of 6,000 to 8,000 TEUs per acre. Although there are many productivity factors, that are beyond the control of the terminal operator, this metric nonetheless indicates that U.S. terminals have significant room for improvement in their operations.

Another measure of marine terminal labor productivity is tons per hour paid. This measure had been rising steadily from about three tons per hour in the early 1980s, to almost eight tons per hour in 1994. However, in the past eight years, it has remained steady or even declined slightly, despite significant investment in port infrastructure and the advent of double-stacked, intermodal rail. Currently, the range for container ports is from less than 7.5 tons per hour paid at Northern California ports to almost 10 tons per hour paid in the Puget Sound ports of Seattle and Tacoma.

Other measures of productivity include equipment cycles-per-hour and gate moves-per-hour. Although this metric must be factored for equipment and technology differences as well as for the type and mix of containers handled, there are still significant differences found among very similar marine terminals. For example, two East Coast ports in nearly adjoining states have developed public terminals with an

overlapping customer base and with similar container gantry cranes. However, in one of the terminals they commonly achieve a lift rate of over 35 moves-per-hour, whereas in the competing port under similar conditions, they generally can lift only 25 containers per hour. In both ports, it is recognized that the difference lies in local work practices. Similarly, simple innovations such as truck trains (units moving 3 to 6 container units with one motive unit), have allowed the Port of Vancouver to enhance productivity through increased terminal throughput and an improved ratio of containers handled per acre.

Fault Lines Around Environmental Permitting

Productivity increases and improved labor practices will not be sufficient to sustain the growth of intermodal cargo in the United States. Ports and intermodal terminals, as well as the connecting infrastructure, will require land for expansion and improvement. However, the current regime of local, state, and federal permitting procedures constrains intelligent land use planning for transportation projects. Regulations that were drafted decades ago, such as the Clean Water Act of 1972 (CWA), have been expanded and reinterpreted to include activities that were never considered at the time they were initially passed.

In addition, local and state jurisdictions regulate many port construction and maintenance activities that are also



Myth: Metropolitan Planning Organizations (MPOs) will be able to effectively identify and fund intermodal freight projects of national significance by bringing freight to the table.

Fact: MPOs can play a valuable role as local implementers of projects, but a national vision and national level leadership will have to lead that MPO response.

subject to federal permit procedures. The results are a patchwork process in which neither the project proponents nor the regulators are ever sure of the validity of any permitted activities. This combination of ambiguity and overlap of jurisdictions results in the practice of regulation by lawsuit. A valid permit may be granted for construction or dredging, and then challenged in court by any number of special interest groups with sufficient funding to mount a lawsuit. Even if these suits are frivolous, the project proponent can lose millions of dollars due to construction delays and legal fees. Until the environmental permitting process is clarified in federal statute, crucial port improvement projects across the nation will be held hostage to this arbitrary process.

Fault Lines in Funding Intermodal Improvements

Building necessary intermodal freight capacity in a congested metropolitan area is capital-intensive and extremely time-consuming. The largest and most complex of these critical improvements can take decades to plan, design, and construct. Compounding the enormous costs of port and intermodal investments is the fragmented funding approaches of each mode. Highway development is largely financed through the Highway Trust Fund. Ports rely on a combination of user fees (port charges), revenue bonds, state debt, and private financing by the terminal operators. At the same time, railroad infrastructure is totally funded through the private capital investment of the railroad companies.

The North American Intermodal System

Burdened With Mounting Levels of Pressure



Source: Trade and Transportation, 2003

Conventional wisdom dictates that the costs should be borne by the beneficiaries when infrastructure projects receive public funding. This approach has been applied through fuel taxes, ad valorem taxes, harbor maintenance taxes and other freight taxes and shipping fees. However, experience has shown that the revenue from these higher taxes often is not administered for the benefit of those who pay them. Rather, it often goes to a fund that is vulnerable to raiding and redirection. Carriers and shippers can no longer tolerate additional fees that do not generate specific results.

The disparity in modal funding sources, the huge capital costs, and the overlapping of modal operations create a financial fault line between the modes. State MPOs and state departments of transportation do not have the political support or the financial resources to address these national projects since the benefits do not directly accrue to the local entity. Meanwhile, ports generally do not have the authority or the financial resources to invest in external highway or rail projects, even though such investments are critical to that ports' competitive advantage. Private-sector railroads are even further removed from federal infrastructure funding sources. Railroads, too, need improved port connectivity and corridor investment. Given this fragmented investment climate, the national transportation infrastructure cannot realistically be expected to function as an

integrated system. Yet there is no integrated funding mechanism for maintaining and improving that system, and simply asking the shipper to absorb another fee will not solve the problem.



Conclusions

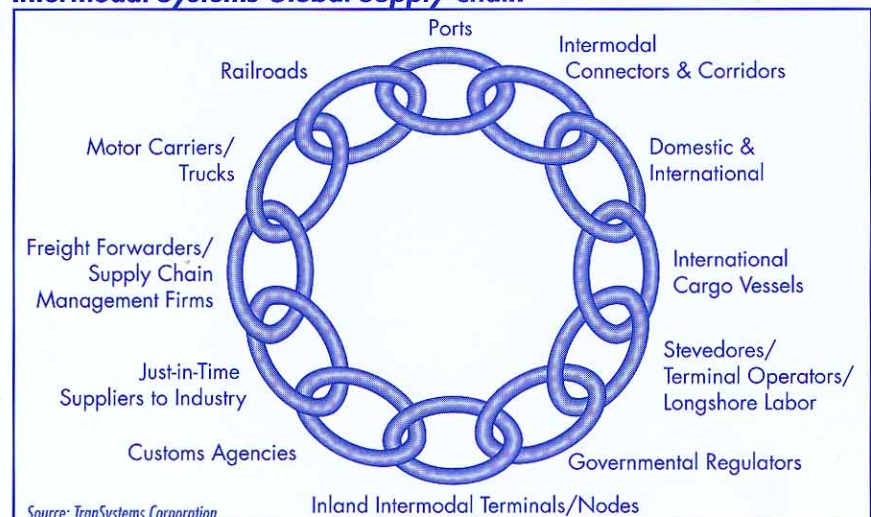
CONCLUSIONS

The U.S. freight distribution system functions as an integrated supply chain, and that supply chain will only be as effective as its weakest link. The Study Team found weak links or fault lines in the nation's intermodal system. Without immediate intervention on the highest levels, these fault lines will cause irreparable damage to the economy. The following conclusions outline those weaknesses and suggest potential solutions.

Reliable Cargo Movement: Lifeblood of the National Economy

When the transportation network falters, the first indication is a deterioration in system reliability due to inadequate and unpredictable infrastructure capacity. Cargo arrives late, or worse, it arrives sporadically and in unmanageable quantities. Transportation costs soar as contingency measures are implemented and shippers scramble to supply their

Trade and Transportation—Study of North American Port and Intermodal Systems Global Supply Chain



customers. Shortages of goods and materials close factories, and the national economy is crippled. Despite this, the nation's political, business, and labor leaders are not engaged in comprehensive transportation planning.

Future Cargo Volumes: Overwhelming the Nation's Infrastructure

While the nation's freight transportation infrastructure is undergoing phenomenal growth in freight demand, simultaneously, this infrastructure is not experiencing focused attention to plan, finance and build the capacity to accommodate this unprecedented level of freight movement. Today, at the nation's largest seaports, intermodal yards, and highly congested metropolitan areas, transportation providers are losing the efficiency battle because of inadequate capacity.

National Security: An Inseparable Part of Transportation

With the September 11th attacks, transportation security must focus on prevention of incidents that are intended to disrupt the nation's economy or to harm its citizens. At the same time that U.S. ports are being called upon to tighten security, they are also preparing to support military operations overseas. Without revolutionary improvements in port operations and productivity, the next emergency military mobilization has the potential to tie up commercial port operations

for the deployment of military cargo. Currently, the only program under way to provide for this contingency is the USDOT's National Port Readiness Network.

Integration of the Modes: The Unanswered Challenge

The U.S. does not have an "intermodal system" as such. Rather, it has an incrementally built aggregation of public and private modes of freight transportation, each of which are stovepiped within their own historic development and individual areas of interest. Although each mode is effective in its own particular specialty, each has a vertically integrated information system; vertically integrated planning; development and management programs; and vertically integrated funding mechanisms with minimal cross-talk between modes. While considerable progress has been made in developing systems to better integrate intermodal data and operations, much work remains to make this a truly and wholly integrated, national transportation network.

Freight planning and investment in the United States is also mode-specific with little consideration of how the investment ties together with the global supply chain. In addition, development of the national transportation infrastructure is controlled at the local, MPO level. As yet, there is no national freight planning and investment policy to foster the nation's global trading competitiveness,

This report concludes that the U.S. port and intermodal freight transportation system is now being operated in many areas at the limits of its maximum capacity. Should any component of the system break down, more than one-fourth of the national economy will be crippled.



Myth: The U.S. freight transportation system is fully integrated between modes and provides a seamless exchange at the hubs.

Fact: The freight carriers are vertically integrated to provide world-class intermodal services on their component of the system, except at the interchange hubs.

and integrate the modes and their underlying information systems into a cohesive system.

Focused, high-level dialog between the private and the public sectors does not take place in the national transportation planning process. Nowhere is there one primary point of accountability for coordinating the development of the national transportation network and integrating it into a true intermodal system.

Labor: Part of the Solution

In his book *Thriving on Chaos*, Tom Peters states, "We are misusing automation. Americans still see it as a tool to reduce the need for labor, not as a tool to aid labor in adding value to the product." Unfortunately, automation and IT are most often regarded by both union and management leaders as tools for reducing the reliance on a local, well-trained work force. At the same time, both parties ignore the opportunities for enhancing the productivity of existing terminal labor categories, and for creating new labor categories within the intermodal transportation system.

The nature of the Longshore Union hiring hall practice and the lack of a cohesive permanent workforce on marine terminals and overtime premiums tend to create a lack of incentive for individual workers to increase productivity. In addition, labor is not involved in terminal decision making

and has little ownership in the success or failure of the overall operation.

The adversarial labor relationships that evolved in the early decades of unionization are obsolete in the development of an efficient, intermodal marine terminal. They are constraining productivity, stifling innovation, and hurting the U.S. economy.

Environmental Regulations: The Conflicting Mandate

For years, a combination of regional permits and categorical exemptions had protected port and infrastructure projects from unduly burdensome regulatory procedures. However, in the last few decades, those values have been forgotten, and the U.S. public has been presented with an adversarial image of port development versus environmental protection. Ports are now faced with monumental regulatory obstacles for even the smallest projects in the name of environmental protection.

At the same time that development of existing marine terminals is being constrained, adequate land for new port and intermodal facilities is becoming scarce. On a per-acre basis, marine terminals return little or no property tax revenue compared to competing projects such as waterfront residential developments. Under current regulations, Brownfield conversions are fraught with constraints and unacceptable risks for the project

sponsors, and other facilities reuse programs that often have multiple conflicting stakeholders. Therefore, zoning of new land for transportation facilities is a low priority at the municipal level.

No-Action Alternative: The National Economy at Risk

Cargo delays and service reliability problems are only the first indicators of the coming transportation breakdown. The real crisis will come when catastrophic transportation breakdowns cause businesses to alter their production strategies, to back away from domestic assembly because of the unreliability of their supply chain, and to outsource the entire manufacturing process, importing only finished goods.

Investing in Our Future: New Funding Mechanisms

The United States does not have a national freight infrastructure funding program. Without such a program, even the best intentions of the private sector and local jurisdictions will not allow this nation to finance and build a national intermodal system.





Recommendations

RECOMMENDATIONS

National Freight Policy

National leadership must create an intermodal action agenda, and that leadership must come from the top. The Study Team believes that there already is a national freight policy statement which appeared in the preamble to the ISTEA legislation:

It is the policy of the United States to develop a National Intermodal Transportation System that is economically efficient and environmentally sound [and which] provides the foundation for the Nation to compete in the global economy and will move people and goods in an energy efficient manner.

This ISTEA language sets the vision; the vision now requires specific steps toward realization. Given that the value of all freight movement represents about \$9.1 trillion dollars, there can be little question that freight is important to the nation, its North American neighbors, and its trading partners throughout the world.

The vision of ISTEA was correct, but specific programs are now needed to ensure that the U.S. freight system first functions as a system, and second that

funds are directed toward that policy objective. A viable freight policy cannot be an implied suggestion; rather, it must be a managed program. Congress cannot afford to say freight is important and then expect state departments of transportation and MPOs to embrace freight as an unfunded mandate. Therefore, the following recommended "Building Blocks for Change" should be put in place.

Building Block One: A Clearly Defined Freight Program Within the USDOT

After the passage of ISTEA, an Office of Intermodalism was created. However, this office is thinly staffed, and given no resources to carry out a national mandate. Managing and investing in the North American intermodal system will require seasoned expert staff to mobilize and manage a comprehensive program of intermodal solutions. Therefore, the Office of Intermodalism must be given the mandate, the authority, and the funding to function as a unifying element between the modal administrations.

There are specific projects within the modal administrations that are beginning to address some of the issues raised in this study, and these projects should be promoted and enhanced in future efforts. These projects have been

run on shoestring budgets with little integration into the mainstream operation of the USDOT. The primary function of the Office of Intermodalism should be to cross-connect such projects and ensure that they receive adequate funding. As much as the freight modes must be linked horizontally to form an intermodal system, so must the freight and intermodal offices be linked horizontally within the structure of the USDOT.

Building Block Two: A National Intermodal Planning and Development Initiative

Strategic investments must be directed to the planning and implementation of intermodal projects having national significance, and specifically designated, categorical funds must be made available for this implementation. Freight planning must get more attention at the state and MPO levels to better address freight projects of local and regional significance. Concurrently, projects of national significance, such as gateways, will also require national leadership. The TEA-21 Program entitlement called the "Corridors and Borders Program" should be recast as a program titled "Gateways of National Significance" (GNS) and charged with the distribution of categorical funds for administration through existing programs on the state and local levels.

Under the GNS program, the USDOT should initiate several intermodal pilot

projects in locations where cohesive working groups are already in place to address impending infrastructure choke points. Examples of high-priority projects include the following current intermodal initiatives:


- California Global Gateways Program
- New Jersey International Intermodal Corridor and the Port Authority of New York and New Jersey's Port Inland Distribution Network
- The Chicago Cross-Town Project
- The Mid Atlantic Rail Project
- The Washington State FAST Corridor Project

The GNS program would bring a global perspective to these projects by inter-linking them into a coast-to-coast freight transportation plan. Projects that are planned for Chicago must factor in developments in California, as well as in New York and New Jersey. Therefore, the funding and leadership of this program must have a national vision and strategy. No longer can transportation programs of national significance be planned solely at the MPO level.

This national leadership should come from a Federal Freight Advisory Committee composed of private freight industry executives, appointed by the president, to provide regular and informed interaction between the USDOT and the freight community. Such an Advisory Committee, balanced in composition, would provide industry guidance to the newly recast GNS program, as well as to the proposed

"Ten to 12 years is too long for communities to wait for badly needed transportation projects. Workers and families sitting in traffic for hours, or manufacturers unable to transport cargo, inventory, and goods because of transportation bottlenecks deserve improved highway and transit projects."

Rep. Don Young (R-AK),
regarding H.R. 5455,
(Expediting Project Delivery
to Improve Transportation
and the Environment Act)



Myth: We can secure our freight transportation system by inspecting everything that comes through our ports of entry.

Fact: More than 6 million containers enter U.S. ports each year and move by truck or rail to every state in the Union. Inspecting every container would essentially freeze international commerce and require terminal space that simply does not exist.

intermodal pilot projects. Additionally, this Advisory Committee should be sensitive to transportation security issues, military deployment needs, and other issues of national importance. The Freight Advisory Committee must be a participant in the development of a comprehensive approach to freight security. This initiative should function in concert with the Transportation Security Administration (TSA) in the new Department of Homeland Security.

A National Cooperative Freight Research Program should be created to direct original research at understanding intermodal as a system. Just as Congress has funded the Cooperative Research Programs for highways and for transit, so should it fund a program in support of U.S. freight competitiveness in a globalized economy. The new Federal Freight Advisory Committee should help to develop this program and be fully integrated into its operation.

An important function of this research program will be to establish criteria for funding intermodal projects under the GNS program. New parameters of funding criteria should include the following research data:

- Local, regional, and national cargo volumes, measured in both tons and TEUs, and maintained current on a monthly or quarterly basis

- Up-to-date measurements of freight traffic flow densities in the critical hubs and corridors
- Objective data that identify serious choke points in highly congested critical GNS
- Performance measures that identify freight technologies having high-asset utilization levels
- Efficiency and productivity measures that recognize not only infrastructure improvements but also other complementary technology initiatives

Building Block Three: Freight Data and IT

A National Intelligent Freight Initiative should be launched to create a secure yet scalable freight information technology system. The current Intelligent Transportation System (ITS) initiative for highway users should be expanded to include a parallel effort for Intelligent Freight Systems (IFS). This technical effort will require input from the newly formed Freight Advisory Committee to ensure that the technologies can be implemented by the multiple stakeholders in the U.S. intermodal system. This initiative should enhance the efficiencies of the current "legacy" systems as well as interface directly with the new national transportation security initiatives.

The first task of the National Intelligent Freight Initiative should be to develop a National Freight Data System that

quantifies cargo volumes moving through the intermodal system and tracks the complex interactions between the cargo modes. The Bureau of Transportation Statistics manages the Commodity Flow Survey, but this effort does not provide timely origin-destination data that are critical to the management of the U.S. intermodal freight network. Implementation of this data system would serve the nation's interest in the following ways:

- Private sector data would be made available to authorized users through implementation of global access protocols. While it must protect the proprietary nature of commercially sensitive information, a national clearinghouse for timely cargo data is the key element of a true intermodal freight system.
- National programs to improve intermodal throughput capacity could be targeted on a systemwide basis because transportation planners would understand what types of cargo move, when they move, and how they move.
- Improvements, that are made under the GNS program, could be evaluated as they are implemented and, if necessary, adjusted to accommodate changing cargo flows.
- Container security should be a high priority under this program.
- National security programs to track the movement of hazardous

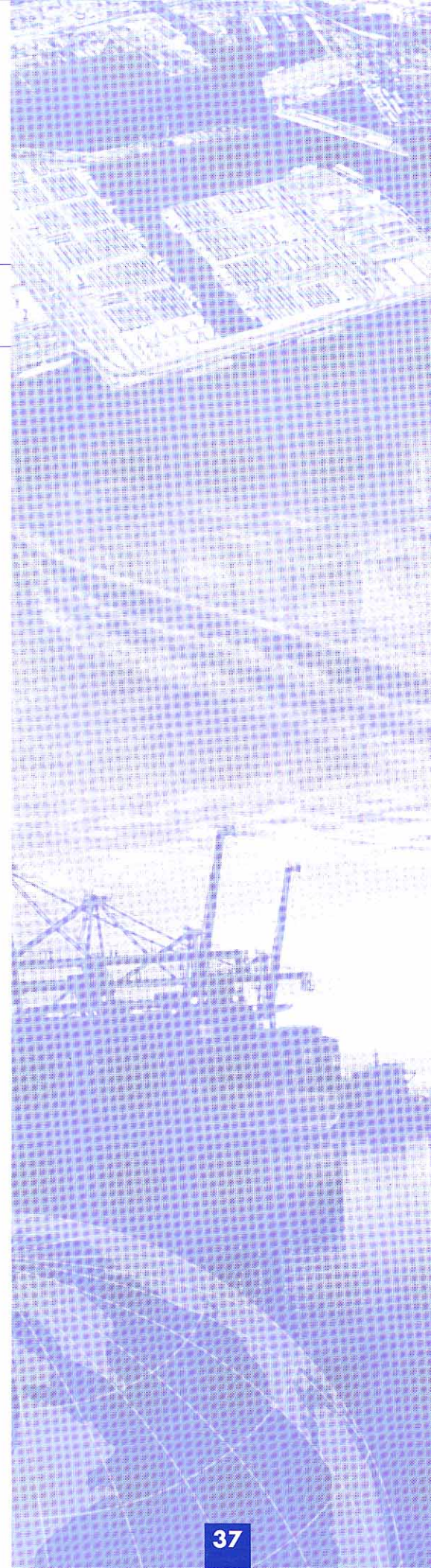
materials would be facilitated through the improvement of "in-transit visibility."

- Particular priority should be given to technologies that improve both security and productivity.

Building Block Four: A Coherent Environmental Regulatory Process

The regulatory obstacles to intermodal freight improvements must be remedied. Federal regulations must be created that would crosscut conflicting state and local environmental constraints to the development of the national intermodal freight system. The permitting process to dredge channels the process to address Brownfield's conversion and regulations to protect the land around intermodal hubs and corridors for freight related development are but three of the regulatory processes, that must be reformed within the USDOT and the Environmental Protection Agency (EPA) planning regulations. Among these reforms, some of the more immediate needs are as follows:

- **Streamlined Permitting:** Reform current procedures that create conflicts between federal and state regulators to give project sponsors a "one-stop shop" for environmental evaluation and compliance. This one-stop shop must include comprehensive regional and categorical permits for routine port construction and maintenance projects. In addition, create realistic costs and timeframes for permit evaluation and eliminate the current practice of "regulation by lawsuit."





- **Brownfield Conversion:** The current Brownfield programs for remediation and reuse of abandoned industrial property should be aggressively enhanced where conversion for freight use is possible. Existing Brownfield sites should be catalogued for possible freight conversion, and a fast-track, preapproval status should be designated for those sites with high freight potential.
- **Freight Land Banking:** If lands around major freight facilities are not preserved for freight functions, then warehousing and distribution are pushed to the suburbs or the countryside. Adequate land must specifically be protected for future freight projects in growing urbanized areas to prevent "freight sprawl" and the attendant problem of added emissions, added truck traffic, and extra costs to the national freight bill.

Building Block Five: Labor Integrated Into National Freight Policy

The USDOT must launch an Intermodal Labor and Management Productivity Improvement Program to refine work rules, and ensure the intelligent implementation of new technologies. Now is the time for a more creative approach for aligning labor issues with productivity issues. Representatives from the major transportation unions must be engaged in the Cooperative Freight Research Program to ensure that new

technologies could be implemented by the existing work force. This participation of labor would also ensure that new work rules could be developed to accommodate an evolving industry.

As a part of this program, labor representatives should be included in the newly formed Freight Advisory Committee to ensure that committee recommendations are sensitive to labor issues. At the same time, labor experts must be available to advise the National Cooperative Freight Research Program about the potential impact of new technology on current labor practices and to help craft a framework for future management and labor agreements.

Building Block Six: Funding Options

Realization of a coherent and effective National Freight Policy would be a complex and expensive effort that requires the cooperation of many disparate public and private entities. Therefore, the avenues for funding these activities must be incorporated into the overall National Freight Policy program, or its implementation will ultimately fail. Several options have been proposed for funding the National Freight Program, which should be explored further to evaluate their potential viability. Without endorsing any specific funding proposal, the options that were identified are summarized briefly below:

- **Expand Eligibility for Existing TEA-21 Programs:** Consider a number of expanded eligibility areas

for current transportation programs.

This could include increased priority for freight projects under guaranteed revenue bonds and transportation financing programs. These existing financing tools, which are currently managed by the USDOT, should be modified to be more freight friendly with lower eligibility thresholds.

- **Redirect the Ethanol Tax:** Currently there is a 5.3-cent subsidy per gallon on the use of ethanol that costs the Highway Trust Fund (HTF) \$1 billion annually. The fund loses an additional billion dollars annually of the ethanol tax deposited to the General Fund rather than to the HTF. Combined, the two actions have reduced highway account revenues by \$2 billion per year for ethanol-blended fuel. This tax could be returned to the HTF to help fund intermodal projects.
- **Repeal the Railroad Diesel Fuel Tax:** Repeal and return the 4.3-cent deficit reduction tax on diesel fuel assessed against the railroads. This would free up \$175 million per year that the railroads could direct into capital projects.
- **Issue Tax Credit Bonds:** The American Association of State Highway and Transportation Officials (AASHTO) proposes a semi-private Transportation Finance Corporation (TFC) to issue Tax Credit Bonds. Under the TFC, \$60 billion in bonds would be issued from 2004 to 2009, including \$5 billion in a capital revolving fund, which could be applied to intermodal projects. The premise is that the TFC and the sale of the bonds would address a shortfall in the HTF.
- **Redirect Customs Revenues:** Currently, the U.S. Treasury collects customs revenues as customs duties. In FY 1996, customs revenues totaled \$22.3 billion, of which about 70% (\$15.6 billion) is attributable to cargo moving through seaports. All or a portion of these revenues could be directed at seaport and intermodal system enhancements.
- **Increase the Federal Gasoline Tax:** Proponents argue that a modest increase in the federal gasoline tax would add revenues to meet the increasing demands on the surface transportation infrastructure system. An increase in the federal gasoline tax should not be considered until all current HTF revenues are fully utilized. Furthermore, many in the trucking industry believe that a fuel tax increase is not justified in the foreseeable future, particularly if the industry continues to face barriers to increased profitability.
- **Fund a National Freight Transportation Bank:** A national bank could be created to stimulate freight investments. It would be modeled after the Freddie Mac or Fannie Mae, two institutions that have been

"Our nation must not underestimate the magnitude of the freight capacity issues facing our transportation system and our economy.

Intermodal traffic is increasing at a rate much greater than our current ability to satisfy the growth. The solution is not singular or simple, yet I believe this study provides a comprehensive view of the issues, as well as, recommendations for a solution."

Jeff Crowe, Chairman and CEO, Landstar System, Inc. and Vice Chairman, U.S. Chamber of Commerce



effective in stimulating the home mortgage market.

- Create a New Series of Bonds, Transportation Bonds (T-Bonds): These bonds, issued and underwritten by the U.S. Treasury, could be sold through normal commercial channels, and made available to private investors and investment portfolio managers. A portion of the revenues from the bond sales could be apportioned to the GNS.
- Consolidate a number of successful financing concepts and package them as a market-based, freight enhancement program. Components of the program could include:
 - Qualified intermodal investment tax credits
 - Industrial revenue bonds directed at freight capacity building
 - Urban Development Action Grants for freight facilities
 - A waiver of certain property taxes on freight facilities

for port and intermodal development proposed for the future. This study provides a road map to reach that goal.

Only through the aggressive implementation of new technologies and more efficient allocation of existing resources can the intermodal system accommodate the forecasted cargo volumes. These improvements must be implemented nationally, across the entire intermodal network to be totally effective. As yet, the United States does not have a comprehensive national plan

Appendix

APPENDIX

METHODOLOGY

In preparing this study, the consultant team cataloged 16 representative North American ports based on a predetermined set of criteria that defines the current and future role of each individual port in the U.S. transportation system. This catalog of data was gathered based on existing current master plan information and operator interviews.

Data Sources

The consultant team used data currently available from the American Association of Port Authorities (AAPA), from the port operators, and from extensive port data sources within the team itself to identify the size, location, and characteristics of existing marine terminals. The port inventory was combined with criteria fields to create a comprehensive database of the selected ports and their primary characteristics.

Containerized Cargo Forecast

Baseline volumes were developed for each of the 16 ports and were segmented by trade route and direction. Econometric forecasts were applied to each trade route by segment and

direction, allowing the consultant team to develop macro drivers for each region of the country. These macro drivers were then applied to the individual ports by market segment and trade route to develop a forecasted growth rate for each port.

Port Capacity

Where current capacity analysis was not available, the consultant team used a computer capacity model derived from a MARAD methodology that analyzes a combination of components and default values to derive the limiting factors within each marine terminal as well as an estimate of the Maximum Practical Capacity (MPC) of the port.

Measure of Port Operational Effectiveness

The consultant team evaluated a range of criteria, including the gross throughput per terminal acre, the ability to serve local industry, the local generator of economic activity, and the ability to serve strategic needs of the national economy. Although these criteria are often used as justification for port development, they are difficult to quantify. Therefore, the consultant team did not address the relative merits of one individual port versus the others.





Future Needs

It is anticipated that future demand for cargo throughput will exceed the capacity in many regions of the United States. In this analysis, cargo capacity needs, approximate acreage, and inland distribution needs were evaluated.

Fleet Technology

The methodology for forecasting future fleet deployment was based on the premise that lines always attempt to deploy the most cost-effective vessels that can be supported by trade density and length of route. Therefore, the consulting team considered constraints such as the Panama Canal, U.S. land bridges, and channel restrictions in overseas ports. These trends in vessel deployments were analyzed by major trade routes—Transatlantic, Transpacific, Round the World (RTW), Pendulum North, Pendulum South, Panama Express, and Suez Express.

Intermodal Issues

The study team examined the planning documents of each target port and collected pertinent information on existing rail facilities and any commentary on rail needs. Working within the context of economic forecasts and trends, this information was synthesized across the port sample to arrive at a characterization of both projected port-rail intermodal status and desired improvements.

Land-Side Congestion

The study focused on congestion in and around the ports, and how on-site and regional congestion and mobility concerns can be dealt with in a systematic manner. These issues include connections between the street and highway system and the port, congestion at key bottlenecks on the port facility, and congestion that affects port cargo on key freight corridors through and between urban areas.

Recommendations for Actions by the Public and Private Sectors

The analysis, as outlined, provides a basis to substantiate actions by the public and private sectors to ensure U.S. ports' capabilities to service national foreign trade. This analysis was developed by a Blue Ribbon Advisory Panel of industry stakeholders for presentation to the local and federal government agencies.

Based on this analysis outlined above and discussions with the industry, the consultant team formulated specific recommendations for presentation to the U.S. Congress in advance of the next round of TEA-21 reauthorization.

UNITS AND TERMINOLOGY

Ton Miles: Inland freight routes are compared in this study based on tons of freight carried times the total mileage it is transported.

Route Miles: Freight modes are compared by gross available miles of infrastructure. This unit is more often used to evaluate growth (or decline) of the resources for that mode.

Intercity Mileage: This unit is used to evaluate the relative long-haul miles of route infrastructure available to a transport mode.

Twenty-Foot Equivalent Unit: Abbreviated "TEU," it is the most common unit used in the international container shipping industry. It is the equivalent volume of one standard 20-foot container.

Forty-Foot Equivalent Unit: This is the equivalent volume of one standard 40-foot container. Abbreviated "FEU," it is equal to two TEUs.

Throughput Capacity: Container terminals measure their maximum capability to transfer cargo in terms of TEUs/year.

U.S. TOTAL IMPORTS AND EXPORTS

The figures for total U.S. imports and exports of containerized cargo vary widely depending on the source of the data. This is mainly due to how the containers are counted, and who is counting them. Therefore, a brief explanation of the figures used in this study is in order.

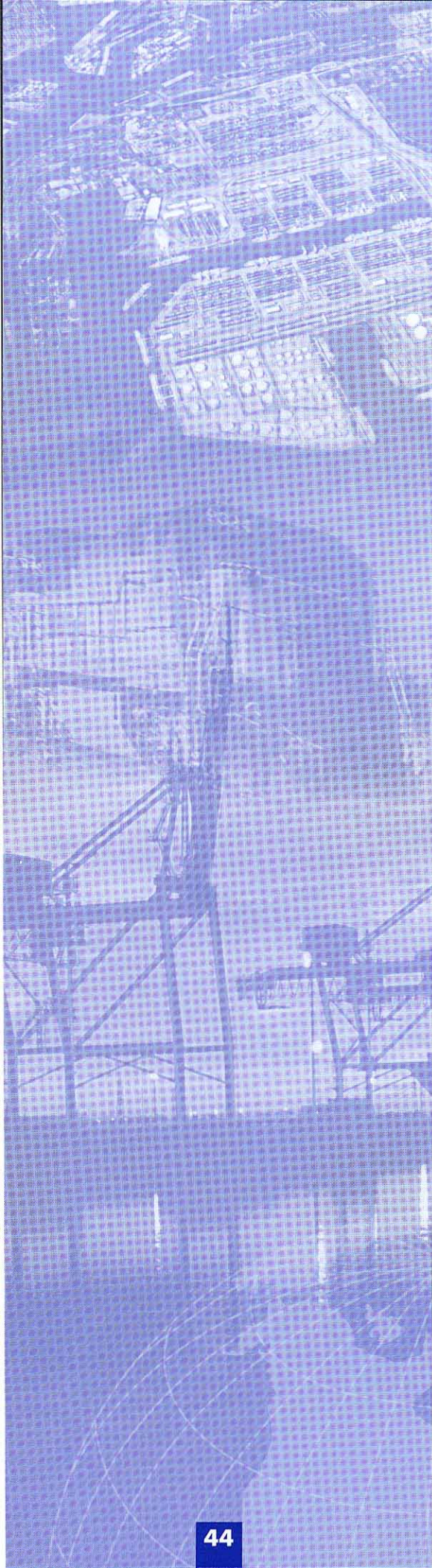
U.S. Customs: The Customs Department reports that about **5.5 million loaded containers** enter the U.S. seaports every year.

TEUs: At a ratio of about 1.7 TEU per container (considering the mix of 20-foot and 40-foot containers), there are about **9.35 million loaded TEUs** entering the country every year.

Total Imports: A small percentage of imports are empty containers that are not part of U.S. Customs records. Including these containers, approximately **10.0 million TEUs** of empty plus loaded containers are imported through U.S. ports annually.

Total Imports Plus Exports: In the long run, the number of exported, loaded plus empty containers is equal to the total number of imported containers. Therefore, about **20 million TEUs** are imported and exported every year.





Domestic Cargo: Domestic cargo, including coastwise container barges; mainland cargo shipped to Honolulu, Anchorage and San Juan; and U.S. military cargo total annually about 1.5 million to 2.5 million TEUs, bringing U.S. total imports, exports, and domestic cargo to about **22.5 million TEUs** per year.

Transshipment Cargo: U.S. ports also transship containers from large vessels to smaller vessels. This cargo does not pass the terminal gate or enter the U.S. economy. Total transshipment cargo is unknown, but likely ranges from 1 million to 2.5 million TEUs per year. Therefore, containerized cargo crossing U.S. docks can be estimated at about **24 million to 26 million TEUs per year.**

Reported Cargo: There are 30 container ports that handle over 99% of U.S. containerized cargo. Every year, the *Containerization International* magazine reports the annual throughput from these 30 ports in its *Annual Yearbook*. The 2002 total throughput of these 30 ports is about **26.5 million TEUs.**

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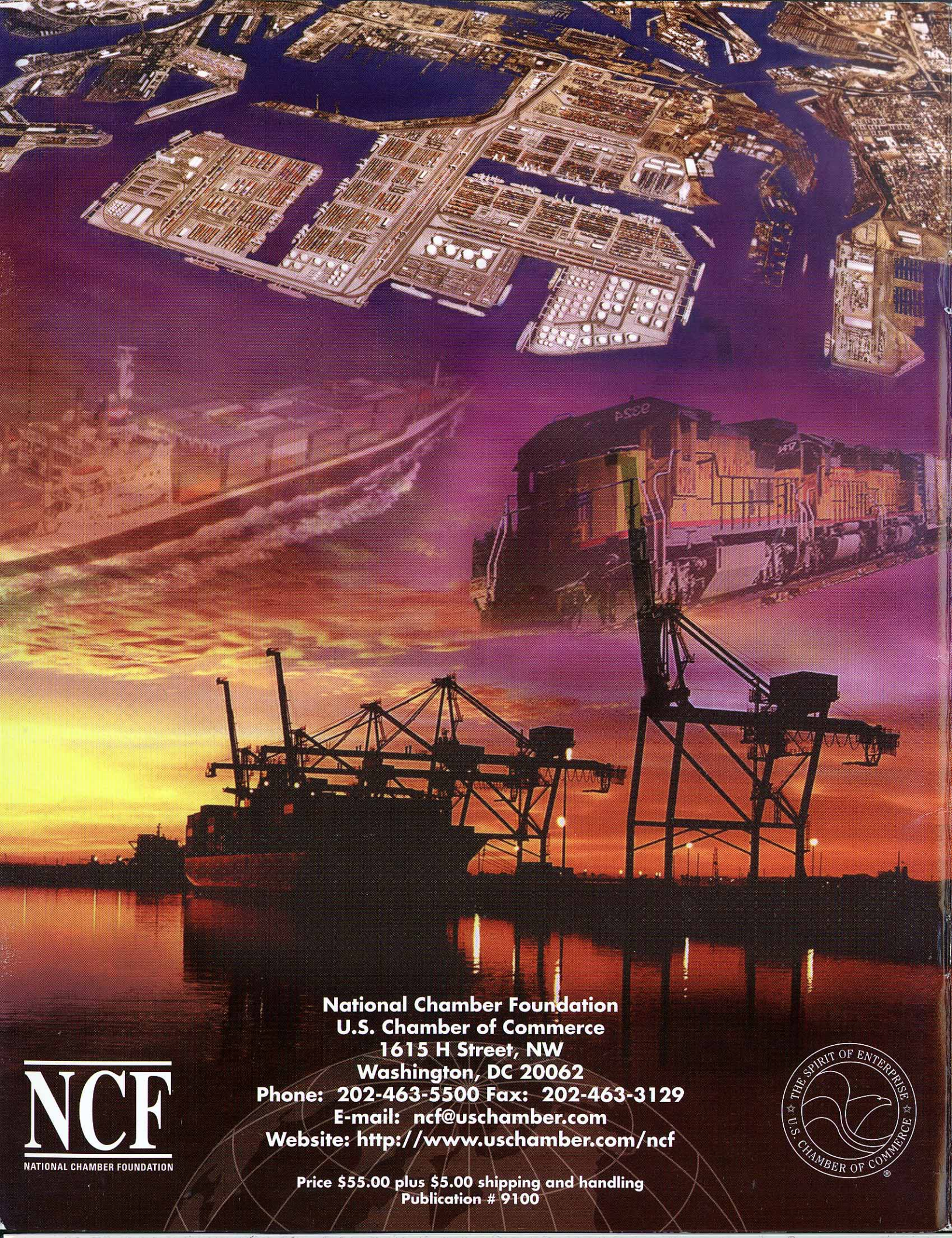

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